

A response to the PRA's consultation paper on Model risk management principles for banks

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Introduction

UK Finance is the collective voice for the banking and finance industry. Representing more than 300 firms, we act to enhance competitiveness, support customers, and facilitate innovation.

The PRA's proposal

We are pleased to respond to the PRA's consultation paper [CP 6/22](#) Model risk management principles for banks. We note that the PRA has drawn heavily on existing the Federal Reserve's 2011 Model Risk Management Guidance, [SR 11-7](#), but also added expectations about how firms should approach the use of Artificial Intelligence (AI) and Machine Learning (ML) in modelling. This is helpful as firms seek to realise the benefits of new technology.

The PRA is proposing 5 principles which it considers to be key in establishing an effective model risk management (MRM) framework. These cover:

- *Model identification and model risk classification*
- *Governance*
- *Model development, implementation and use*
- *Independent model validation*
- *Model risk mitigants*

In CP 6/22 the PRA confirms it is seeking to adopt a proportionate approach, both between larger and smaller firms and within each firm. This is an important underpinning to the principles that we strongly support.

The PRA is proposing that the requirements should be implemented 12 months after the publication of the finalised Supervisory Statement. By this time the PRA expects that all firms applying the proposed principles will have undertaken an initial self-assessment and prepared remediation plans to address any shortcomings.

Key messages

Principles vs Prescriptiveness

We support the PRA's principles-based approach which applies supervisory judgement that is risk focussed and forward-looking. CP6/22 espouses this approach, but we are concerned that elements of the draft supervisory statement are expressed in an overly prescriptive way. In our principle-by-principle analysis below we have suggested wording that may be helpful in 'de-prescriptivising' the Supervisory Statement, to make it more principle than rules-based.

Model Definition

The model definition in sub-principle 1.1 is wide, and it can be interpreted to bring into the scope of MRM frameworks many processes not currently covered by MRM e.g., non-modelled expert judgement-based decisions. Is your intention to widen the scope of MRM to include more qualitative expert judgement-based approaches?

In addition, regarding sub-principle 1.1b, we would appreciate further guidance on what deterministic quantitative methods the PRA expects to be material enough for firms to bring into MRM governance. This has the potential to increase the scope of model risk for our members.

The role of the Board

We expect a firm's board will seek to adhere to the good practices laid out in the MRM principles supervisory statement, while having some space for flexibility based on its contextual interpretation of them and its view of the application of the PRA's Fundamental Rules as expressed in Appendix 2 of [PS5/14](#). We similarly expect the PRA to apply a principles-based approach when examining firms' implementation of the MRM principles.

As currently drafted the principles (particularly Principle 2) impose unrealistic obligations on boards about, for instance, their degree of understanding of the probability theory underpinning models and expectations about their involvement in model oversight. Importantly the CP expresses the PRA's view that it expects MRM to be assigned to an accountable individual and that an SMF holder should be identified to take on this responsibility, and it is with this SMF where we believe primary responsibility for implementing and adhering to the MRM principles should reside. The SMF holder should be responsible for explaining to the board the uncertainty around judgements made based on model use, in what circumstances models could be 'wrong', and how there can y be different ways to measure risk. The board, or more realistically a board sub-committee should provide suitable, but non-technical challenge of, among other things the firm's model risk appetite, and not be a substitute for the role of the accountable senior manager, based on the approach described in the 2015 speech on [Governance and the role of boards](#).

Senior Management Function

We welcome the principle of a single accountable executive responsible for model risk management. However, the SMF requirements suggest the PRA expects the CRO should fulfil this role, but the responsibilities in sub-principle 2.2b i - vii are too detailed for a CRO. It should be accepted that the

SMF will delegate operational responsibility for model risk management to a non-SMF, for instance, the Head of Model Risk.

Proportionality and the impact on smaller firms

We strongly support the PRA's proposal that the MRM principles should be applied in a way that is commensurate with a firm's size and complexity and the degree to which it uses models in its business activities. We would welcome the PRA extending its proportionate approach to immaterial business areas within a larger firm, requiring them to only focus on the basic elements of Principle 2 in these cases. Such differentiation of requirements and practices based on the systemic importance of, and risk presented by a firm, or its immaterial business areas, contributes to meeting the PRA's secondary objective of facilitating effective competition between the firms.

But it is clear from discussions with our smaller members that they believe that the impact of the MRM principles will be significant as they will capture a much wider range of models than most firms currently include in their model governance processes. So the 12-month period to undertake an initial self-assessment and prepare remediation plans to address any shortcomings will be challenging. Some firms may wish to call upon third parties to assist them in this process at a time when such resource is already stretched.

Whilst recognising that balance sheet size is an imperfect but widely considered proxy for systemic impact we suggest a phased approach to implementation of the proposed MRM principles, with firms with less than £25bn of total assets being required to implement them no sooner than two years after the publication of the finalised supervisory statement.

Proportionality should also consider model materiality as well as firm size. As we note above for all firms we believe the treatment of individual models should be proportionate to the importance of those individual models. Most of the more prescriptive requirements will only be appropriate for the more material models. Self-assessment may be a more appropriate approach for less material models than independent review. We believe that for the most basic models simply including basic information in the inventory should be sufficient.

The CP as written allows very little proportionality in relation to model tier and we believe that the wording should be amended to reflect that requirements should be proportional - otherwise the benefit of using model tiering is not clear. For example the model tier should be the determinant for the need for benchmarking and monitoring, and for the performance testing range and depth. We note that this was a key piece of feedback, that the PRA responded to, on the Stress Testing Model Risk Requirements – see 2.7 – 2.9 in [PS7/18](#) paper and 2.2 – 2.4 in the associated Supervisory Statement ([SS3/18](#)).

Interaction with other UK regulations

We see this regulation as building directly on SS3/18, extending some of its principles and its scope beyond stress testing. Clarity on whether this CP supersedes SS3/18 in the sense that, if a bank complies with the requirement arising from CP6/22 (particularly in regard of its stress test model suite), then this ensures compliance with SS3/18. It would be desirable to confirmation of this. Otherwise banks will be burdened with duplicate assessments of two strongly overlapping regulations, with this duplication adding little incremental value.

International cooperation matters

We note that the PRA's proposed Principles incorporate many aspects of SR 11-7 that are already familiar to our larger more internationally active members. The PRA has additionally sought to bring SR 11-7's expectations up to date, by incorporating references to AI and ML. We support such cross-pollination between regulators and supervisors but suggest that this initiative be given a truly international standing by the PRA and Fed encouraging the Basel Committee on Banking Supervision to engage with this topic to produce its own Principles for Model Risk Management in due course.

Comments on specific principles

Principle 1 – Model identification and model risk classification

1.1a

The model definition in this principle is wide and a strict interpretation could bring in scope many processes not currently covered by MRM. Is it the PRA's intention to widen the scope of MRM to, for instance, include pure calculation processes?

Otherwise a strict interpretation of could bring into scope many processes not currently covered by MRM e.g., expert judgement-based decisions. This may have unintended consequence, including resource impacts on firms using fewer models for low margin portfolios, or even the dropping of calculators completely. Members would like to differentiate between models and calculations with it being key that the latter is not in scope. A basis for differentiating between the two could be by examining if two independent people, given exactly the same information and tasked with producing quantitative estimates could reasonably come up with different assessments. In this case the process should be considered a model. On the other hand, if there is an unambiguous right answer, for example the amount of interest accrued on a current account, then the processing of the inputs or information required to produce the answer should not, we believe, be considered a model, even if the calculations themselves are highly complex.

To better reflect the intention that complex unambiguous or deterministic quantitative methods are not automatically identified as models, and to bring the definition in line with the one provided in the Background section (1.7) where it is said that "The output of models are estimates, forecasts, predictions, or projections", we suggest replacing "output" by "estimates or projections".

A model is a quantitative method, system, or approach that applies statistical, economic, financial, or mathematical theories, techniques, and assumptions to process input data into outputs that generate or support decisions. The definition of a model includes input data that are quantitative and / or qualitative in nature or expert judgement-based, and output that are quantitative or qualitative.

1.1b

More clarity is needed on the intent of this clause. It is unclear which non-model deterministic methods are in scope and what aspects of the framework firms are expected to apply them. In relation to their bearing on business decisions would, for instance, methodologies used in planning M&A activity be

in scope? These are commercially and market sensitive decisions which may not be taken routinely or frequently. In our view it is questionable whether such models should be in scope of the MRM principles. So we suggest that an element of materiality be introduced into footnote 6 as follows:

...be understood here as all regular and material decisions...

1.1c

While we agree with this principle this is a requirement specifically for methods that are not classified as models and so outside the scope of MRM and does not fit well in an MRM Supervisory Statement.

This section has the potential to bring a large number of non-model tools used by banks into scope (e.g. complex spreadsheets, virtually all IT systems and banking infrastructure, end user computer applications as well as all calculations contributing to the financial accounts). We suggest its deletion, or failing that, suggest a modification of the wording as follows:

..., the PRA expects the implementation and regular use of deterministic quantitative methods...

This will avoid any bespoke business decision tools or analysis being brought into scope and draws a clear distinction between model-related decisions and other business decisions.

1.2

Many models will be interdependent to some extent. We recommend the wording of the first paragraph of 1.2 is changed to:

....help to identify material model inter-dependencies.

The same concept of materiality should be introduced into 1.2b)

1.2a

It is unclear what is meant by the phrase 'under development' and we doubt if models that are under development but not yet deployed could pose a risk. Firms are unlikely to be able to maintain full list of models in the initial stages of gestation if the intention is to capture models in the planning phase. Additionally, maintaining a complete and accurate set of information for decommissioned models adds complexity with little useful additional insight. Perhaps retaining retired models in inventory for defined short period can be an alternative.

We also suggest the removal of the word 'complete' as this will not always be possible, particularly for models under development.

1.2c

i)

Model operating boundaries and the intended use of the model with a comparison to its actual use, should not be captured in the model inventory. Instead, they should be included in the model development and validation documents. Adding these fields in inventory would be operationally and resource intensive and add little value if they are already covered in the model documentation.

Also, the term 'model operating boundaries' should be clarified as it is currently unclear what it is intended. There is often no abrupt boundary at which models fail, rather it is important to understand significant uncertainty and limitations of the model.

ii)

Similarly, model simplifications and limitations should be a requirement for model documentation, but not the model inventory.

iii)

Findings from validation should be left in the independent model validation process. Listing individual findings in the inventory, when this is typically managed in a workflow tool, would be too onerous. This should be restricted to just the outcome of the last validation.

1.3

We agree with the principle of a risk-based model tiering to prioritise validation and other risk controls. However, this sub-principle introduces many new factors firms should consider when assessing model complexity. We suggest a simpler, principles-based approach for assessing model complexity.

1.3a

It is unclear what is the most significant factor when addressing materiality and complexity, and we would welcome more discussion with the PRA about the precise meaning of materiality - is it really risk-impact?. There has been some suggestion that complexity in this context means uncertainty, if this is indeed the case, we would prefer any reference to complexity be changed to uncertainty, but this merits further discussion.

It is our current understanding that as materiality is described first in this Principle 1.3 it is the more significant factor of the two; a view that is supported by the observation that materiality ultimately underpins the significance of a model's output.

1.3c

This proposal introduces many new factors firms should consider when assessing model complexity. We suggest a simpler, principles-based approach for assessing model complexity.

Performing this complexity assessment for every model would bake a degree of 'analysis paralysis' into the principles. Also as we believe that as 1.3c relates mainly to AI & ML this may also be better placed in a new section on ML and AI.

"Frequency and/or extensiveness of use of the model" is better categorised as a materiality measure. It is also overlapping with the "the purpose of the model and its relative importance to informing business decisions" in the materiality dimension.

In addition, complexity/uncertainty would be unknown for the purposes of validation prioritisation (particularly for new models)

1.3d

The requirement in '*periodic validation*' of the tiering approach should be sufficiently covered within the standard regular policy reviews. The PRA should make clear that the expectations do not go beyond regular policy reviews.

Principle 2 – Governance

The instances laid out in the rest of this section show that Principle 2 suffers frequently from a lack of distinction between Accountability and Responsibility; in fact it would benefit greatly from a systematic "RACI" analysis throughout. We suggest that the wording of this Principle is reviewed in this light and rewritten precisely.

We suggest the second sentence of this Principle is modified as follows:

Firms have strong governance oversight with a board that promotes an MRM awareness culture from the top ~~through setting clear model risk appetite~~. The board ~~approves the MRM policy and appoints an accountable individual to assume the responsibility to~~ develop and implement a sound MRM framework that will ensure effective MRM practices.

This reflects our members' concern that many aspects of model risk management may fall outside the understanding of the board. Model risk is just one of the many risks that boards are required to oversee. In our view it would be better that an accountable individual appointed by and answerable to the board, or more realistically a sub-committee of the board, takes responsibility for this.

2.1b

We suggest that 2.1b should end after the first comma and thus read:

The framework should be designed to promote an understanding of model risk, on both an individual model basis as well as in aggregate across the firm. ~~and should promote the management of model risk as a risk discipline in its own right. The framework should clearly define roles and responsibilities in relation to model risk across business, risk and control functions.~~

2.1c

This subsection is too prescriptive about the contents and depth of the Risk Appetite. No firm can accurately quantify its model risk profile versus its appetite. Furthermore there is also no articulated expectation of what the board is expected to do with this information when it is presented to them. This clause should be amended as follows to reflect this.

We suggest replacing “...*should include measures*...” with “...*may include measures*...”

Reflecting our suggestion that the accountable individual be responsible for the MRM framework we suggest modifying this sub-section as follows:

The accountable individual appointed by the board should set a model risk appetite that articulates the level and types of model risk the firm is willing to accept. The model risk appetite should be proportionate to the nature and type of models used. Firms’ model risk appetite ~~should~~ may include measures for:

2.1e

We are again concerned with the level of expertise expected of boards to judge the output of models. Given the breadth of board responsibilities it would be impractical for them to fulfil all these requirements alone. For other risk types they are usually assisted by board sub-committees and senior management. We suggest the PRA update this sub-principle to recognise the board’s ability to delegate to sub-committees and senior management, so it is aligned with the IRB approach and SR11-7 guidance

2.2a

This principle calls for a single accountable executive, perhaps an SMF 4 or 7, but most usually the Chief Risk Officer. Responsibilities in this sub-principle are too detailed for a CRO, and there are other roles (not designated as an SMF) better placed to assume these responsibilities e.g., a Head of Model Risk Management. Additionally, this is more detailed than the SMF4 and SMF7 Statement of Responsibilities and regulatory guidance for the other principle risks.

We suggest the PRA update this sub-principle to enable a role not designated as an SMF to be the single accountable executive e.g., a Head of Model Risk Management, either via direct appointment or SMF delegation.

Firms should identify a relevant accountable executive most appropriate within the firm’s organisational structure and risk profile to assume overall responsibility for the ~~management~~ of model risk management framework, its implementation, and the execution and maintenance of the MRM framework. The relevant SMF should be the most senior individual with the responsibility for controlling of the risks resulting from models operated by the firm. Firms should ensure the Statement of Responsibilities of the accountable SMF reflects the specific accountability for overall MRM.’

2.2b

We suggest that sub-paragraph vii should be removed as issues of budgeting and IT resource availability fall outside the purview of model risk and the CRO particularly.

2.3a

The Board, or in our view a board sub-committee, should only be responsible for challenging the executive on the overarching framework of MRM and be able to delegate the approval of lower-level firm-wide MRM policies. We think it should read;

~~Firm-wide policies~~ The overarching framework should be approved by a sub-committee of the board and reviewed by the board on a regular basis to ensure ~~their~~ its continued relevance for:: the firms' model risk appetite and profile; the economic and business environment, the regulatory landscape the firm operates in; and new and advancing technologies to which the firm is exposed.

2.3b

The final sentence of this clause should be removed as this already fits into other compliance monitoring areas and, for instance, may be carried out by Internal Audit.

2.3c

This is a very comprehensive set of expectations about policies and processes over the model lifecycle and strays from a principles-based approach to one that is unduly prescriptive given the range of firms to which the Supervisory Statement will apply. This perception could be easily removed by amending the last sentence of c) as follows:

~~At a minimum,~~ The policies and procedures should may cover:

- iv) Data quality management is typically covered by other existing frameworks and hence it does not need to be part of the MRM framework. The PRA should acknowledge that model owners are already accountable for the data that is used in their models under SR117, an approach we support.
- v) We suggest removing '*and monitoring of the effectiveness of the validation process*'. This is too vague an expectation and should be modified with the inclusion some 'success criteria'.
- vi) We suggest "guidance around thresholds for acceptable model performance" rather than "the thresholds for acceptable model performance".
- vii) We understand this Principle 2.3 as addressing the MRM Framework in its totality, not individual models. We suggest this sub-section could more usefully be included in Principle 5.

2.3d

We have suggested that a board sub-committee should appoint an SMF with responsibility for the MRM Framework. We therefore suggest para 2.3 d be modified as follows:

The SMF with overall responsibility for the MRM framework should ensure the adequacy of ~~board-level~~ policies for material and complex model types.....

2.4a

This clause provides an inappropriate level of detail about the level of skill, experience and seniority of the individuals involved in model governance and risks eroding organisational flexibility.

2.4b

This is unnecessary as, under the requirements of 2.4c, model performance will already be monitored against the firm's board-approved risk appetite for acceptable model performance.

2.4c

i)

Individual models are monitored against their agreed monitoring plan, but risk appetite is at group or legal entity level so individual models cannot be monitored against an aggregate risk appetite. We suggest modifying this principle:

the model's performance is monitored against the firm's ~~board-approved risk appetite~~ approved monitoring plan for acceptable model performance;

2.4d

For many model types there is a large number of potential model users and keeping an accurate up-to-date inventory of model users will be operationally intensive. Firms typically assign a model owner (MO) for all models, align models with a model ownership area, and record this individual in their model inventory. The model owner is usually a senior model user and accountable for the roles in 2.4 i and ii.

We suggest the removal of this sub-principle and move the accountability in 2.4 d i & ii to the model owner in 2.4 c

2.4f

We suggest this sub-paragraph be moved to Principle 4, which addresses independent model validation.

We also believe that much of this sub-paragraph is unduly prescriptive and inconsistent. For example, if the background of validation staff is relevant (we do not think it should be) then it should also apply to model developers too, which we do not believe it should.

2.5a

It would be helpful if the Supervisory Statement were to acknowledge that the internal audit approach to model risk management should be risk-based and that the intensity and frequency of audit assignments across different areas may differ.

2.5b

A statement on Internal Audit's inspection of model development should be added, in the same spirit as iii) on model validation. We suggest:

v) model development staff have the necessary experience and expertise to develop suitable and sound of models for their intended use and the capacity and interest to respond appropriately to findings and issues raised in the course of model validation;

2.6b

This clause should be more granular as its current wording suggests the possibility that vendors themselves can undertake validation. Is this what the PRA intends? It is also unclear if this relates to credit bureau (generic) scorecards. If this is the case, it would make 2.6b i) unrealistic.

Also, Vendor (i.e., third party) models are generally validated and approved in a manner that is consistent with in-house developed models. However, proprietary technical details (such as model specification, code etc.) are not always available as vendors understandably want to keep confidential certain key intellectual property aspects of their products. Firms' validation often relies on other validation methods to compensate for this e.g., sensitivity analysis and benchmarking.

We suggest the PRA update this sub-principle to recognise the potential limitation in getting technical model details from vendors and the firm's validation function's ability to utilise other validation techniques to compensate.

2.6c

Some members are concerned that it may not be practical to ensure that the parent company of the model-using subsidiary have aligned model risk management frameworks with the firm. Some global firms might not necessarily want to align their global MRM frameworks to the PRA expectations set in the SS. Instead, some PRA expectations might be implemented only locally, at the level of the UK subsidiary regulated by PRA.

Others, where frameworks do align, and have been established at group level - and subsidiaries have had the opportunity to input into it – would welcome the opportunity to 'outsource' validation to the group. Such firms would welcome the PRA's views on how local oversight of this proceed should be evidenced.

Principle 3 – Model development, implementation and use

At the end of the introduction to this section we would we suggest the addition of the words '*where practical and appropriate*' to emphasise the principle of proportionality.

3.1a

The term ‘for the intended use’ should be changed to ‘for all intended uses’ as this better captures models with multiple uses.

‘valid’ should be changed to ‘reasonable and sound’ as it is logically impossible to know if all assumptions are valid until they are tested.

‘and mathematical theory should be correct’ should be changed, e.g. to ‘and mathematical derivations should be correct’. Theories (and models) are rarely, if ever, “correct” (cf “Models are never perfect” in SR 11-7).

(footnote 17): change ‘model performance target metrics’ to ‘model performance targets’. Prescribing target metrics for accuracy of derivative pricing models would be highly dependent on the product and portfolio and should include a large degree of expert judgment.

3.1b

‘Where possible’ should be changed to ‘where ~~possible~~ and practicable”.

3.2b

The bias question is separated among the other parts of this principle, and it is confusing – on the one hand avoid bias part b, on the other assess, correct and control it – parts c and d. To reflect this, we suggest the following rewording of 3.2b:

The model development should process its data in a lawful, fair and transparent way, in accordance with Data Protection, GDPR and other relevant data regulations.

3.2c

We suggest the removal of “and the potential limitation should be taken into account in the model’s tier classification to reflect the higher model uncertainty”. See the broader point on complexity in 1.3c.

3.2d

We suggest the removal of ‘or the use of proxies’ as it is impractical to capture this across all model types. ‘recorded in the model inventory’ should also be removed, as this will make the inventories too cumbersome to enable users to aggregate model risk.

3.2e (footnote 18)

This is not applicable to this supervisory statement as such unstructured data has not been incorporated into any kind of model, and model risk management should not be used as a way of accessing this. We would therefore like to see the removal of unstructured data from this clause, so it should read:

and the complexity introduced by interconnected data and increased uncertainty of alternative and unstructured data should reflect in the model's tier classification to ensure the appropriate level of rigour and scrutiny is applied in the independent validation activities of the model.

3.3a

The clause should read '*to aid selection between candidate models*'. This better reflects the fact that while testing is a useful tool in the selection of models, stakeholder expert judgement also plays an important role in model selection.

The need for a monitoring pack should be linked to the model tier.

3.3b

We think this sub-section seeking to identify how model performance may deteriorate over time. Members feel this is slightly idealistic as it is not possible to evaluate a model's performance against a possibly large range of different circumstances.

3.3c

Both sub-sections ii) and iii) should begin with 'where practical and appropriate', as it is unclear, based on the current wording, how often models should be tested and how frequently. We note that for some model types it is not appropriate to carry out these tests as this makes tiering dependent on having considered benchmarks as opposed to benchmarks revealing heightened uncertainty. The performance testing range and depth should also be linked to the model tier.

3.3d

It is our view that this clause should be removed. It is not appropriate for all models. Some models are recalibrated every day and it would be unrealistic to performance test them every day. For instance, certain models are only dynamically calibrated to reflect market conditions so do not need to be re-tested.

3.3e

This clause is reasonable however *parallel outcomes analysis* should be deleted as it is unclear what is meant by this.

3.4a

We would prefer that this clause reads '*adequately understood, recorded and managed*'. This is because it is unclear how a firm would 'adequately manage' risk and it is not always possible to mitigate risk in all cases. This also reflects the fact that model uncertainties and limitations are captured through robust documentation.

3.4b

For the sake of clarity this sub-section should read:

'The model development process should consider the need to use expert judgement to make model adjustments that modify any part of a model during the development process'.

We believe that this makes it clearer that this expectation does not relate to model adjustments made after the completion of the development process. We would also like to see 'outputs' removed from this clause. Outputs may be subsequently modified by post-model adjustments, as described in Principle 5.

3.4c

It would be more appropriate for this information to be held in the model documentation rather than the inventory. As stated earlier this would otherwise make the model inventory too cumbersome for users.

3.4e

The phrase *'intuitive from a business and economic perspective'* should be removed as this would introduce a degree of subjectivity into the assessment, and potentially lead to dissonance between model users, developers and potentially other stakeholders.

3.4f

We suggest the removal of:

'and be responsible for developing and implementing clear remediation plans, when deemed necessary, to address the model limitations by better incorporating risks into models so that reliance on model adjustments will be reduced over time',

as we disagree with the implication that the use of model adjustments is deleterious. Making adjustments after the models are in use can improve them as more will be data available to enhance their performance. The use of expert judgement is sometimes a deliberate choice and should not always require a remediation plan.

3.5

Members would like a specific statement on the documentation requirements for vendor models. For practical and contractual reasons, we cannot expect the same scope and detail of documentation for vendor models as for internal models.

3.6a

We suggest removing *'The findings of any system and/or implementation tests should be documented.'* The previous sentences are enough. The sentence *'The systems should be subject to*

rigorous quality control and change control processes' could be generalised to *'The systems should be subject to rigorous control processes including quality control and change control.'* (with documentation of system tests potentially being part of the control processes).

3.6b

We suggest removing 3.6b entirely and relying in 3.6a) as the meaning of "suitability" is vague. It should either be removed or clarified.

Principle 4 – Independent model validation

4.1a

Members would like clarity on what is meant by the term 'system' in this context. Banks are full of systems! This would assist in demarcating the boundary of this CP regulation with BCBS239 and other systems environment validation requirements.

4.1b

The periodicity of re-validation should be based upon materiality that is agreed upon by firms and their supervisor. The wording currently places sole responsibility for periodic re-validation on the independent validation function. In practice, in some firms, the first line is responsible for undertaking validation activities which are subsequently reviewed and challenged by the independent validation function. We therefore recommend that this clause is updated to read:

The validation function should be responsible for providing their recommendations to the appropriate model approval authority on both model approvals and periodic re-validations

This reflects 2nd line's accountability in understanding and commenting on the model's re-validation, although this may be based on work performed in other areas,

4.1c

It is our current understanding that although recorded as a model validation process, model performance monitoring is not expected to be conducted by the validation function. This understanding is supported by the text stating that it is the responsibility of the model owner to ensure that "model performance is within expectation" and Principle 2.4 stating that "responsibility for model performance monitoring and the reassessment of already implemented models should be clearly defined and may be undertaken by model owners, users or developers". However, model performance monitoring is covered within Principle 4 (Independent Model Validation) and so results in ambiguity. It is therefore suggested that model performance monitoring is instead covered within Principle 3.

Furthermore, our members request that the supporting text to the model lifecycle diagram is updated to show that "model validation process(es)" do not have to be done by the validation function. Our members support the validation function retaining accountability for the adequacy of model

performance monitoring oversight and periodic revalidation to determine whether the model has operated as intended.

4.1 c ii) - process verification.

Validators should not be responsible for ongoing performance monitoring - this requires independence. It would be helpful if the PRA identified its expectations about validators' responsibilities for process verification.

4.1e

This sub-section should be brought into line with SR 11-7, as members think that its model risk management function has sufficient standing.

4.2a

The sub-section is overly aspirational. It is unfeasible for a firm to subject all models to independent review. A degree of proportionality in the application of this clause, is important, which could be achieved by adding '*an independent review where applicable*'

i)

The phrase subjects '*reporting outputs*' to model validation. It is not clear what constitutes '*reporting outputs*' – would a PowerPoint presentation made using model output would qualify? So we suggest replacing '*reporting outputs*' with '*model outputs*'.

iv)

independent review function to '*ensure those judgments have been conducted in an appropriate and systematic manner*' – the independent review function can challenge the judgments, but strictly speaking, cannot '*ensure*' any actions conducted by the first line. We would recommend replacing it with '*verify that there is a process to conduct those judgments in an appropriate and systematic manner*'.

v)

This section should read

'conduct additional testing and analysis as necessary to enable additional potential model limitations to be identified...'

The identification and documentation of the model limitations is primarily the responsibility of the first Line of Defence. The validation function might identify additional limitations not captured by the first Line of Defence.

4.2b

We suggest the replacement of '*review*' with '*independent initial validation*'.

4.3a

Clarity is needed for this section as it requires firms to *'conduct appropriate verification of model processes and systems implementation'*; As this sits in Principle 4 does this implicitly mean the "validation function"? If it is not the validation function it should not sit in this section. If it is the validation function it should be explicit (but we believe this would be overly prescriptive as this work often sits outside validation). For instance there are a large number of reports using models outputs created outside the validation cycle by the business for ad-hoc needs. Keeping track and reviewing the accuracy and relevance of these reports should be the responsibility of the report/business owner rather than the independent validation.

iii)

'reporting outputs – reports derived from model outputs' could be many steps removed from the model. It is not practicable to trace all the reports where the model outputs may be used. This requirement should be restricted to cases where reports are prepared in an automated manner feeding directly from the model.

4.4 a

While most models are subject to frequent model performance monitoring, not all models are e.g. stress testing model performance is assessed for the relevant stress scenarios during a stress test, but these models are not subject to performance monitoring outside of the stress tests. We suggest the PRA update this sub-principle to recognise this.

4.4b

Members believe that this sub-paragraph would be better separated from Principle 4 and placed into a separate principle (along with 4.1) as it does not sit well in this Principle on Independent Model Validation.

4.4 c iv

We would welcome further explanation what is meant by the term "parallel outcomes analysis"?

4.4d

Members do not believe model tier alone should dictate frequency. It may be a consideration but is not the only way to determine monitoring frequency. For instance how rapidly the model outputs are expected to move is more important consideration and as such frequency should be removed.

Principle 5 – Model risk mitigants

5.1a

This clause should terminate after the first sentence. The requirements described in the second sentence are already adequately described in Principle 2 - Governance, for instance in 2.3 c) vii).

5.1c

We suggest the references to (undefined) ‘senior *management and possible levels of approval authority* should be removed from this section. Not all Post Model Adjustments require support or approval from such senior levels. This sentence would thus read:

*PMA*s for ~~material models or portfolios~~ should be documented, ~~supported by senior management, and approved by the appropriate level of authority (e.g. senior management, risk committee, audit committee).~~

5.1d

We suggest adding “where practicable” at the beginning of the second sentence, :

*PMA*s should be applied in a systematic and transparent manner. Where practicable, the impact of applying PMAs should be made clear when model results are reported for use in decision making with model results being presented with and without PMAs.

5.1e

We welcome the inclusion of a materiality test in this sub-section but think the materiality should be referenced against the materiality of the model, not the PMA *per se*.

We would like more clarity on the expectations in iii) and iv). These refer to data, not PMAs, so the independent review requirement should not apply to all PMAs but, we believe only to the data used to determine the PMA rather than the whole range of data inputs into the model.

Applying low intensity review to low materiality PMAs would be hard to execute in practice and has the risk of undermining the quality of MRM efforts. A better approach would be to limit the requirement of independent review to higher risk PMAs based on materiality and complexity.

So we suggest the following modifications:

*PMA*s that meet criteria based on the materiality and complexity of the PMA and/or of the models/portfolios should be subject to an independent review with intensity commensurate to the materiality and complexity of the PMAs. The review may be conducted by the MRM or another relevant function properly positioned to perform such review. If a PMA is itself based on the output of a model, that model should be subject to the model validation described in Principle 4 and no further independent review is required.

Materiality of PMA should also reference the immediacy of the adjustment to the model output. An executive adjustment made by an operational committee separately after model control and

governance is quite different from a controlled immediate adjustment to the model output. The former is a model user's overall adjustment of the model, the latter results from a detailed appreciation of the model weaknesses and is managed by the model owner. These require different kinds of review, the latter being more detailed and deeper than the former.

5.1f

We suggest this section should more logically be moved to be placed immediately before 5.1e.

5.3a

The language suggests formulating 'exceptions' up front which is not realistic in practice. All exceptions, once they occur, are escalated and the appropriate management level decides on their approval or rejection on a case-by-case basis.

5.3a ii)

Does "performance exceptions" refer to exceptions triggered by regular monitoring or by other processes? If regular monitoring then this statement should be included in the monitoring sub-principles as an action arising from normal monitoring. If other processes are involved, then does this section then imply the need for additional safety-net monitoring on model performance as another layer? We hope not but this requires clarity.

Artificial Intelligence and Machine Learning models

Question In your view, are there any components of the MRM framework where the proposed principles are not sufficient to identify, manage, monitor, and control the risks associated with AI or ML models?

The proposed principles are sufficient to cover AI/ML driven models. AI/ML is one type of model methodology. Although it has areas of heightened risk (in the same way that other methodologies do), these draft principles, if correctly implemented in a proportionate, risk-based way, are sufficient to identify, manage, monitor, and control the risks associated with AI or ML models, with specific requirements to address the unique characteristics of these models customised within the general principles of the MRM framework.

We may comment further on this in our response to the recent [DP 5/22](#) on Machine Learning and Artificial Intelligence

Responsible Executive

✉ simon.hills@ukfinance.org.uk
☎ +44 (0) 7921 498183

ben.moore@ukfinance.org.uk
+44 (0) 20 7706 3333