



**The Actuarial Profession**

making financial sense of the future

## Defining the Scope of your Internal Model

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# Agenda

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- Context
- Our ***draft*** example
- Discussion (involves you!)

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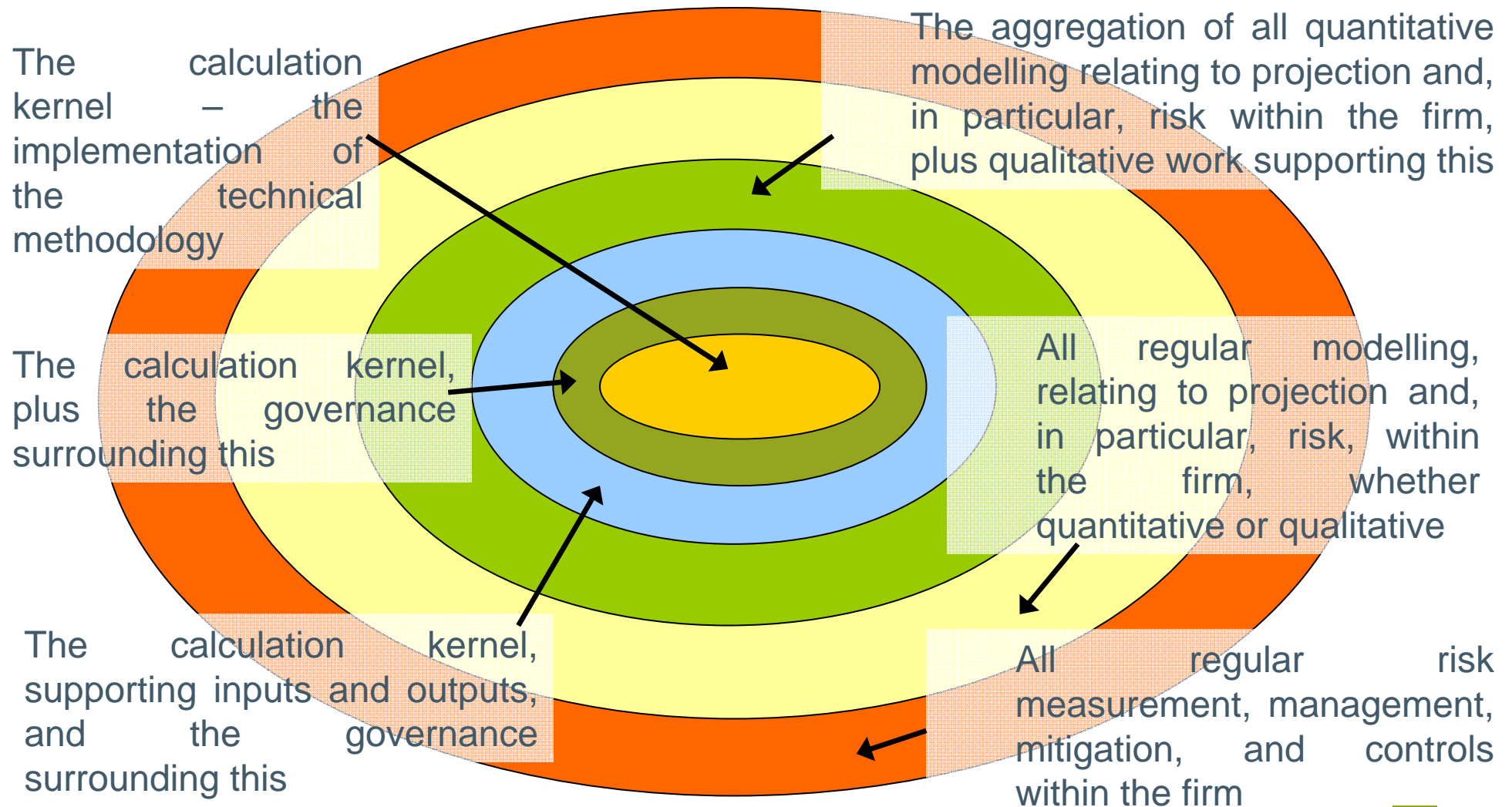
# Aims and objectives

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- Working party seeks to answer the following question:  
*“How do you specify the scope of your internal model, such that management and third parties (particularly regulators) can have confidence in the robustness and coverage of the model, while not restricting the ability of the model to be flexible to respond to changing business circumstances?”*
- We focussed on depth and definition, and did not consider coverage
- Criteria we considered were:

Resource intensity	Restrictiveness on business processes
Relevance to calculation kernel	Materiality of impact on SCR
Impact on ability to meet use test	Impact on stakeholders (policyholders, shareholders, regulators, etc.)

# What is an internal model – a few different interpretations



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# Cutting through the guidance: What is an internal model

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- Here is what we know:
  - It must include a quantitative element which calculates the SCR
  - It is broader than a mere quantitative calculation (that part forms the calculation kernel)
  - It must satisfy the 6 tests, (many of which relate to quantitative aspects) and in particular, the Use test
- In our experience, market sentiment is to keep the interpretation relatively tight (for regulatory and reporting purposes, internal risk management may be much wider) – probably between the second and third of our interpretations
- Our view is consistent with this, subject to the internal model being broad enough to gain and demonstrate confidence in its appropriateness and usefulness for all desired uses

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## Links between the scope and other areas of the internal model

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- The scope of the internal model is linked with:
  - The model change policy
  - The model uses
  - The ORSA
  - The wider risk management framework

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## Market questionnaire

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- We presented interim thoughts at a SIAS event on 27 July
- We did not present our thoughts or opinions at that event, but did present arguments for and against including each area within scope
- We also asked attendees to complete a questionnaire telling us *their* views
- We received... 6 responses
- So the results *may* not be representative of market opinion
  - However they are similar to anecdotal evidence
  - We will discuss these as we go through
  - But we're having another go today

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# The 1-minute summary

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- The scope should fit each firm
- Nevertheless, we are opinionated people and do have a view – this is the main focus for today
- We have drafted an example scope ***to form a basis for debate only***
- It's important to draw the line between the internal model and risk management
- Focus is on whole business quantitative risk measurement
  - Not micro risk assessment as part of day-to-day (e.g. case pricing)
- Wider than calculation kernel (e.g. governance is in)...
  - ...but linked to the calculation kernel
- Policies and frameworks in scope
  - But results (including expert judgement) may be out of scope



## Our draft example



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# Business planning

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- Policy and processes are in scope, including data, analysis performed, roles and responsibilities, validation, and sign-off
- Systems are not
- Specific decisions made are not in scope
- Examples
  - We think that we will achieve 10% rate increases in this class for next year – out of scope
  - That the business plans are first prepared by class underwriters, challenged by a business planning committee (chaired by the CUO) – in scope
  - Change in the CUO may well be a change to the internal model (though we would expect this to be minor – in the context of the internal model scope, not the business impact!)

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# Underwriting risk parameterisation

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- Policy & process is in scope, procedures more debateable
- Specific application of expert judgement is out of scope (framework for expert judgement would be in scope)
- Thus specific values themselves are out of scope (and hence do not trigger a model change)
- But a change in the parameterisation methodology would trigger a model change
- Assessment of minor versus major should be on a case by case basis, but would consider materiality of changes in output (loss distribution, not parameters), materiality of item being parameterised, robustness of assessment of change going forward, and any impact on 6 tests
- Examples:
  - Is the choice to use MLE fitting (as opposed to MoM) in scope?
    - Possible solution: Maybe in scope procedures should say assess both and selection of final parameter down to expert judgement
  - Is the choice to exclude a particular year as not credible (e.g. oversampled) in scope?
    - Possible solution: Arguably covered by data policy (accurate, complete, & appropriate), but maybe credibility left to expert judgement
  - Maybe put in scope that there will be an actuarial sign-off of parameters as best estimate?

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# Catastrophe modelling

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- Catastrophe modelling for the purposes of an aggregate business SCR calculation is within scope
- Catastrophe modelling for the purpose of exposure / limits / aggregation testing may be in scope – if stated as a use of the Internal Model (certainly we would want consistency here)
- Catastrophe modelling for the purpose of pricing an individual policy is out of scope
- All stages of the catastrophe modelling process are within scope
- External models are within scope, and are treated as per internal underwriting parameterisation.
  - The assessment of minor versus major should be reviewed on a case by case basis
- Examples:
  - Procedures governing how data is processed, adjustments and assumptions made, and which options in the cat model are switched on are in scope
  - If a third party cat modelling firm re-parameterises their model, that triggers a model change (potentially major) for you (and many other market participants)
  - If a third party cat modelling firm re-parameterises their Middle East Quake model, to which you have a negligible exposure, that *may* be a minor change, but note this may depend on uses – are you, or will you, use the model to test whether to expand in this sector?

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# Technical provisions

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- Highly debateable
  - Material on SCR, plus other uses?
  - But covered by specific Solvency II guidance – is any value added?
- This may depend on uses, and integration of calculation kernel and technical provisions
- At most policy, process, and maybe procedures in scope, specific application of expert judgement out of scope
- Thus specific reserves themselves are out of scope (and hence do not trigger a model change)
- Examples:
  - Does technical provisioning process include work done on specific assessments (e.g. pricing, commutations etc.)
    - Our view: No, but note that if it did, then any such work would count towards the use test.
  - If the technical provisions ceded ratio is set using internal model output – does that bring technical provisions within scope
    - Our view: It would bring in the parameterisation work for the internal model, but not necessarily technical provisions

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# Reserve uncertainty

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- We think this is clearly in scope
- But just policy, process, and maybe procedures in scope
- Again specific application of expert judgement out of scope
- Thus a change in the reserve risk distribution output not necessarily a change
- But a change from a parametric distribution to bootstrapping would be (say)
- Examples:
  - Is the choice to use a parametric distribution rather than bootstrapping in scope
    - Possible solution: Yes, but could set out that both will be investigated, and selection left to expert judgement
  - Are the parameters within scope (say inclusion/exclusion of specific ratios within the bootstrapping process)
    - Our view: Procedures should be to assess impact of inclusion/exclusion of material factors, then final selection left to expert judgement (and out of scope).

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# Investment management

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- We think that the day-to-day investment management arrangements of an insurer can be left out of the scope
  - But, market risk is one of the risks that must be covered by the SCR – important for insurers to define carefully boundary between internal model and investment management arrangements
- We believe that the calculation kernel for market risk must be considered within the scope
- Example: how sophisticated should modelling of market risk be?
  - Our view:
    - For insurers with relatively low-risk, straightforward investment strategies simple time-series or factor-based market risk models may be appropriate
    - For insurers with more complex investment affairs and liabilities of longer duration, ESGs will need to be considered carefully

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# Technical pricing

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- We considered day-to-day case pricing outside of scope
- But aggregate pricing processes which relate to MI, and in particular impact the parameterisation for the calculation kernel could be in scope
- And governance ensuring consistency between the case pricing and the parameterisation could be within scope
- Example
  - Day-to-day case pricing is out of scope
  - Aggregate rate monitoring *may* be within scope
  - A regular review of consistency between internal model parameters and case pricing assumptions may be in scope



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# Risk framework

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- By risk framework we mean setting the business risk strategy, risk appetite and tolerances, both at board level and drilled down to functional levels
- The risk framework is an input of the internal model, not a consequence
- As such this is a data item, not part of the Internal Model
- However, changes to the risk framework will necessitate (possibly major) changes to the internal model – required under the use test and statistical quality standards test
- We made the assumption that testing the firms risk profile against the desired risk appetite was a use of the internal model, and hence the methodology for this was within scope
  - This may not be true for all firms
- Examples:
  - The decision to not accept certain risks is not in scope
    - But if we start accepting them in the future, we will need to change the Internal Model to accommodate that
  - The methodology for reporting on the risk profile against risk appetite is in scope

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# Operational risk

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- This is one of the categories of risk the SCR is required to cover, so clearly in scope to some extent
- Most insurers focus on managing and mitigating this risk
- We believe the process for quantifying key risks within the risk register and deriving parameters for the frequency and severity of these risks is within scope
- Examples:
  - Should the risk register be within scope?
    - Our view: It is a part of the wider risk management system used for monitoring and assessing risk across different business units and should not be within scope
  - How should external databases of operational risk losses be treated?
    - Our view: These are likely to be used from time-to-time to validate output from the operational risk part of the calculation kernel. As a validation tool, they should not be within scope

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# Risk management

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- By risk management we mean quantitative and qualitative identification, mitigation, measuring, and management of risk within the firm (excluding those specifically mentioned elsewhere)
- These are considered to be out of scope – the Internal Model is only one contributor to risk management
- Examples
  - Maintaining the risk register is out of scope
  - Setting and monitoring aggregate exposure limits is out of scope
  - Setting and monitoring maximum linesizes is out of scope
  - HR policies are out of scope

## Next steps



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## Our next steps

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- We intend to finalise our findings
- A report will be produced
- We will also include market sentiment
  - PLEASE FILL IN YOUR QUESTIONNAIRES
- Hoping to produce this asap
  - But given work commitments...
- Will ensure that we publicise this report
- If you would like to be kept informed, please leave your email with one of us,
- or if you're reading this on the web send an email to [Martin.Cairns@emb.com](mailto:Martin.Cairns@emb.com)

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## Questions or comments?

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Expressions of individual views by members of The Actuarial Profession and its staff are encouraged.

The views expressed in this presentation are those of the presenters.

