

Internal model industry forum:

# Bringing internal models to life for boards

Communication and engagement

Internal Model  
Industry Forum

Supported by:



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# Foreword



Capital models are a valuable and sophisticated tool, but, like all complex tools, they need to be trusted, they need to work properly and those using them need to understand what they can do and also their limitations. In the context of Solvency II, this is especially true of company Boards of insurers, which are ultimately accountable for the quality of the internal capital models and how they can be used. This is also a challenge for Board members and senior executives, who need to feel comfortable and understand what the models can – and cannot – do for them in support of the decision making.

All the above places a requirement on the risk and finance teams to communicate effectively to help board members, and senior management teams, gain sufficient confidence and understanding of the models.

This booklet sets out the findings of our workstream looking at good practice in achieving board engagement with the internal models and ensuring that Board members are well equipped to 'own their models'. It is part of a series being produced by the Internal Model Industry Forum (IMIF) offering guidance on the validation, communication and use of insurers' internal risk models in order to create real value for the business.

I would like to thank the members of the IMIF workstream who produced this work, and particularly Roger Jackson, Dave Finnis and Sam Bullen from KPMG and Niraj Shah from Ageas UK for their work researching and developing the approach in this booklet. The members of our IMIF Steering Committee also provided overall project guidance and quality control. We are also grateful to representatives from the Bank of England (PRA) who have enabled us to maintain a continuous and positive dialogue between industry and the regulator on the work of the IMIF.

I would also like to thank our sponsors Milliman, PwC, EY, Deloitte and KPMG. Also, thanks are due to the Institute and Faculty of Actuaries and to ORIC International and other IRM practitioners for their input to this project. As a not-for-profit organisation IRM is reliant on enlightened industry support to help us publish documents like this. It is this kind of support that helps us maximise our investment in the development and delivery of world class risk management education and professional development.

**Jose Morago,  
IRM Chairman and Founder of the  
Internal Model Industry Forum**

# Introduction

This work stream was set up to help firms think about how to improve the communication and engagement of Boards in relation to Internal Models. Although our focus in this booklet is on Boards, our findings could equally apply to other governance committees charged with oversight of the Internal Model or indeed other topics brought to the Board with a significant specialist content that needs to be carefully explained and understood.

The key aim of the Board, as a collective, is to have the ability to govern the use of internal models in an appropriate manner. This requires a certain level of collective understanding of the model in terms of its structure, scope, methods and limitations (as defined by Solvency II) in order to be able to provide the right amount and level of challenge.

When considering the appropriate level of collective understanding, it is important that the complexity of the model does not become an obstacle to management being able to recognise the key drivers of model outcomes. This also needs to be balanced with a good understanding of the key limitations of the model and the dangers of over-reliance on any model. Indeed, in most instances, simplicity should be a key design principle of the internal model.

## Market Surveys

The IMIF carried out a survey in May 2014, as part of the Validation Cycle work stream. The results indicated that although Board understanding and challenge over internal models was improving, further development was needed.

For instance, only 60% of respondents thought that their Board's understanding was 'mostly adequate', whereas the rest thought it was 'partially effective'. Unsurprisingly, only half thought the level of Board training was 'mostly effective' or better with the rest believing it was only 'partially effective' or even 'basic'. Despite this, 70% of respondents thought that Boards were 'mostly effective' in their challenge over the internal model with the rest believing it was only 'partially effective' or 'basic'.

As part of this work stream, we carried out a survey towards the end of 2014 of a number of CRO's and Non-Executive Directors. As well as providing the base for some of the key principles mentioned in this booklet, they generally concurred with the previous survey regarding a good level of challenge generally being provided by members of the Board. However, they also commented that their ability to challenge was often restricted by the quality of the documents and/or presentations provided to them. It is with this context in mind that we have sought to produce this booklet in order to assist in improving this understanding and challenge process that is so critical to good communication and engagement by the Board.

## How to use this booklet

We have summarised our findings into key principles throughout this booklet and ordered these into different components, namely: Board training; Board assessment and development; Planning and timing of board engagement; Board engagement; and Resourcing. These categories make up what we have described as the “Communication framework”. We have used the components as part of the Communication Framework simply as a way of grouping the key principles together into topics that can be easily discussed, for the purposes of this booklet. It is important to note that the components are not intended to present an order in which these key principles should be carried out, as it is recognised that in practice these key principles may be applied by different functions within the firm and at different times. However, we do note within the section on “Planning and timing of board engagement” that getting the overall process, and allowing an appropriate amount of time, is an important element to successful communication and engagement by the Board.

We envisage this booklet being used by a variety of people within firms, both specialists and Board members, in a number of ways as follows:

- for those charged with governance of the internal model, the booklet could be used to provide a comprehensive view of what to consider when designing, trying to improve, or testing the effectiveness of the internal model governance framework;
- for those presenting to Boards on internal models, we believe the booklet will be a useful reference document and assist in improving future documents or/and presentations to the Board; and
- for Board members, particularly Non-Executive Directors, being asked to collectively attest or sign-off on Internal Models, we hope this booklet will assist them in articulating how, when and what they would like the business to produce for them in order to be able to provide the appropriate level and amount of challenge.

## Other IMIF booklets

Other booklets in the series include: ‘The Validation Cycle: developing sustainable confidence and value’; ‘Operational Risk Modelling: common practices and future development’ and ‘Diversification Benefit: understanding its drivers and building trust in the numbers’. Each of the above booklets touch on communication and engagement with the Board, particularly the Validation Cycle booklet. In addition, future booklets on Natural Catastrophes and the Use Test will be covering this topic, providing further specific examples for the reader to consider.

# Communication framework: overview

In our view the communication framework, as illustrated below, is a good way of establishing the different perspectives on, and hence needs for, communication to the Board. There is no suggestion that such a framework be set up within a firm. However, we believe it provides a means of tracking improvements and management information on Internal Model activity within the firm.

The elements of the framework are not distinct, so overlaps are to be expected between the different components, and in fact some repetition of points within components is to be expected.

The limited market feedback received to date, indicates that the issue is known to be a significant one. In addition there is an expectation from Board members that communication of Internal Models should not be achieved by tomes of technical documentation, but by a combination of facilitated walkthroughs and one-on-one sessions with the modelling team.

## Training

The basic education requirement is met under “Board Training”. This may be broken down further into:

- Initial needs
- New entry training; and
- Ongoing training (to take into account changing model structure and usage over time)

There will also be a differentiation between types of Board members (e.g. Non-Exec/Exec/Expert) for training requirements.

Formal documentation of aspects of the training helps cement the process

## Board assessment and development

Solvency II requires much in the way of specialist knowledge. Care needs to be taken that the overall Board function enables sufficient robust discussion and challenge of the modelling.

This will differ according to the constitution of each Board and the business challenges of each organisation. However, coordination is needed in ensuring that the overall Board level of understanding feeds off individual contributions from members with a range of skills and experience. Documentation and/or presentations by specialists need to be appropriately tailored to take into account the nuances of the Board, to help instigate a healthy level of challenge. It can be beneficial for someone (sometimes called a Board Liaison) to facilitate this process and assess the effectiveness of the challenge process in order to continually improve and develop this critical interaction.

## Communication framework



## Planning and timing of board engagement

This area, which can be described as “Process design” covers the planning and timing needs of Board activity. A key aspect of this is the need to recognise the amount of time good quality documents and presentations take to produce and to build this into the timetable.

## Board engagement

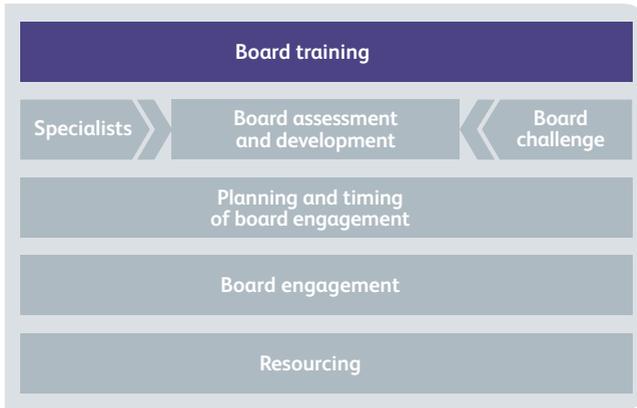
“Board engagement” relates to the relevance and type of Board papers and other linkage with the modelling activity within the business. The Board needs to be sufficiently involved in the planning and ongoing development of modelling activity, as well as the results.

This also takes into account the means of communication of information to Boards. For instance graphical demonstrations can be a strong tool in certain areas, but may not be the best method in all circumstances.

## Resources

Additionally, there needs to be a process to ensure the right capability and availability of resources to produce analysis and relevant papers to the Board, and to present them in a clear and concise manner.

# Board training



## Key principles

**Ongoing programme:** New members to the Board and changes in role or model approach mean that an ongoing training programme is necessary.

**Appropriateness:** Training needs to be appropriate for individual members and for the Board collectively.

**Key concepts:** Include key ideas/concepts such as: what the model is (not) used for and why, rationale behind the approach adopted (e.g. Standard Formula, partial or full Internal Model); and the control environment (e.g. governance, materiality, limitations).

**Common language:** Terminology used when describing risks and modelling often varies across functions/departments. A common risk language for the Board will aid understanding.

**Market comparison:** Identifying the unique risk features of the firm compared to peers can be a useful way of explaining differences in approach compared to market practice, particularly for NEDs.

*“An appropriate level of training should be provided, on an ongoing basis, to individual members to ensure collectively the Board has sufficient understanding of the model.”*

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## What is it?

As the IMIF survey indicates (see P2) there is a widespread suspicion at Board level regarding the extent to which models and modelled results can be relied upon.

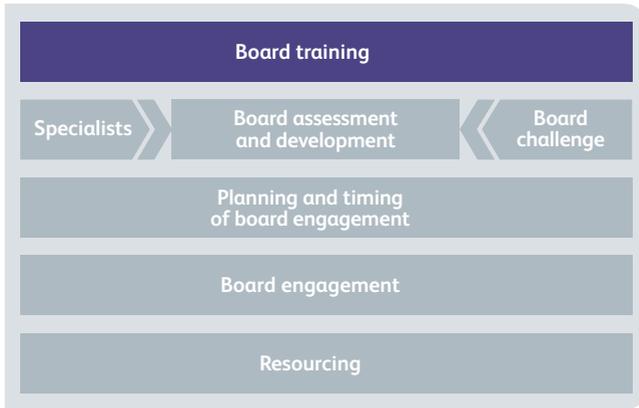
Before the Board can offer rigorous challenge and discussion on the internal model, the Board will need to understand broadly the context in which the model operates. This could take the form of some introductory training for new Board members, as well as CPD style ongoing training for existing members to refresh and update their knowledge.

Sending a message to Board members on the scope of the model is important, as is the scope of its functions, so that an understanding is obtained on the pragmatism of modelling.

It is important to establish the training requirements of individual members to ensure as a collective the Board can demonstrate the requisite understanding. It can be helpful to Board members and regulators to have these individual requirements documented to avoid any misunderstanding.

It is likely that the training sessions will introduce the Board to terminology which they are unfamiliar with. The terminology used when discussing models may differ between teams across the business and so it should be agreed at the outset what terminology will be used when training and discussing with the Board.

# Board training (cont)



More detailed training considerations include:

## Scope of the model

The scope of an Internal Model may be to provide a sounding board for all the key decisions to be made in the management of the firm. Alternatively the scope may be limited to key decisions, such as the level of capital, reinsurance programme, new business planning, asset/liability management, or a combination of such decisions. It is important to communicate to the Board the extent of the model's scope and its role in the decision-making process at all levels within the firm.

## Key features of the model

Whilst it is not necessary, for the majority of Board members, to explain the full technical detail of the model, it is important to get across enough of the make-up of the model to give Board members confidence in the use of the model as part of the decision-making process. It is also important that key judgements underlying model inputs are understood. Sometimes results from the model will, at least initially, be counter-intuitive, so enough confidence in the model needs to be obtained so that such outcomes are not dismissed. This may involve an explanation of the means by which the range of potential outcomes is projected and the interactions between modules within the model. Additionally, it is important to note that key judgements underlying model inputs are understood, alongside the sensitivity of the output to any uncertainty in such judgements.

## Model results

Most Board members will be used to a series of discussions that lead to deterministic outcomes with a range of strong subjective influences. Without an understanding of the likelihood of each of these outcomes, it is difficult to convey the accuracy of such measures. Model outcomes are often expressed as a range and clear decisions are not immediately apparent. Members need to be trained to understand the format of model outcomes and to take them into account in the decision-making process.

## Model “strength and limitations”

Some areas of modelling attract greater confidence in the results, both because of the greater volumes of valid data supporting the model and because of the level of “embeddedness” of the techniques being used. An important part of Board education is the need to communicate the level to which model results may be taken into account in the overall decision.

## Model Governance

Given the Board’s role, model governance should be a critical part of any training programme. In particular the role of any other committees involved, as well as independent validation and why this is fit for purpose. Board members should be clear on the validation process and associated responsibilities and reliances.

## Benefits

- Well documented roles will allow easier demonstration of Board understanding of the model.
- An understanding of the scope of the model.
- A knowledge of how the modelled results are achieved.
- A recognition of the results.
- An assessment of how relevant are the results from the model.
- A good understanding of key judgements and model limitations.
- Production of focused regular reports from model output (see Appendix for examples).
- Assists in demonstrating Board understanding of the business to regulators.

# Board assessment and development



## Key principles

**Understand different roles:** The Board should understand their role as a collective in relation to the model, as well as agreeing individual responsibilities when understanding and challenging the model.

**Actively seek discussion/challenge:** Look for different ways to actively encourage Board discussion and challenge.

**Generic questions:** In order to stimulate discussion and challenge, generic questions are often helpful to Board members.

**Encourage further debate:** Appetite for further requests from the Board should be encouraged, particularly in relation to model validation.

**Feedback:** Feedback should be sought by presenters to adapt content/style to Board's preferences.

**Monitoring:** The level of the Board's understanding/challenge could be monitored to adapt Board training where necessary.

*“Whatever form the Board liaison takes, the objective is to help continually improve the quality of the discussion and challenge from Board members.”*

## What is it?

Executive members of the Board will be from various parts of the firm, whilst non-executive members will often have been selected in order to provide a different, but valued, perspective on the business.

Board papers on the Internal Model will often be produced by specialists.

Given the differences in background between the producers of Board papers and their recipients, inevitably it becomes very hard to pitch Board papers at the right level to the whole Board.

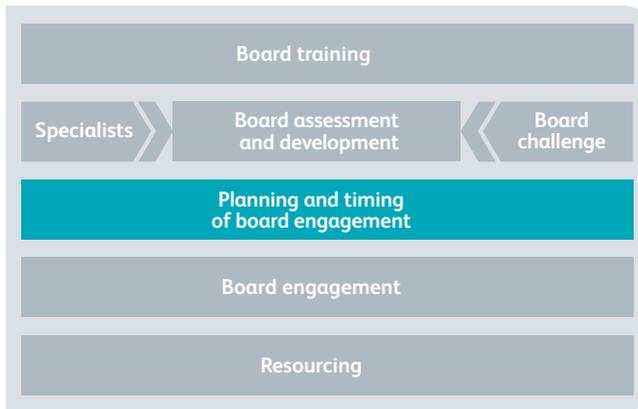
Some form of ‘Board liaison’ to enable the Board to collectively feedback their thoughts to specialists and vice versa is important. Ideally this will be carried out directly at Board meetings or privately, but may need to be encouraged via someone close to the Board like the company secretary, or a separate committee.

Whatever form the Board liaison takes, the objective is to help continually improve the quality of the discussion and challenge from Board members. There are some key principles that should assist in facilitating this dialogue between specialists and Board members. Note that some means of testing the effectiveness of this liaison activity needs to be employed. This may include: mock interviews; formal attestation documents; and presentations by Board members on model capabilities.

## Benefits

- Environment that supports and actively encourages challenge by the Board.
- Monitoring of the Boards understanding allowing training to be better focussed.

# Planning and timing of board engagement



## Key principles

**Communication plan:** A plan should be in place regarding the regular cycle of reporting to the Board, which could include Board training as well.

**Be realistic and top-down:** It usually takes a lot longer to produce good technical papers than expected, so make sure there is enough time in the plan to think about the 'top-down' questions and not be too focused on the detail.

**Time to digest:** Technical topics take longer to understand and comment upon, so think about the best way for the Board to digest the information (e.g. pre-meetings).

**Plan for changes:** Allow time to make any changes post the Board meeting and respond to any queries.

*“Good planning is critical to an effective challenge process, providing the means to ensure the appropriate documents and presentations are produced.”*

## What is it?

A well designed process for Board communication is often the key to successful Board understanding and engagement. This process needs to take into account both production and reporting time frames.

It takes time to convert bottom-up analyses into a top-down storyboard, but specialists are often uncomfortable providing this view. Hence, typically less time should be spent on producing numbers and more time on understanding and presenting them to management.

A clear and robust process to Board communication should help facilitate further debate and discussion.

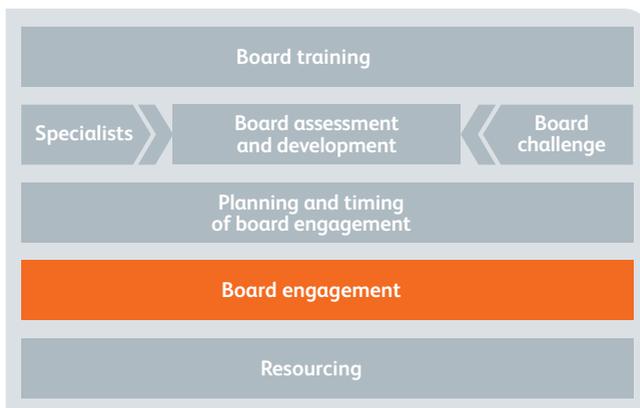
It should not be assumed that the Board's input to the model is complete once a discussion has been held. The Board may need additional time to digest and potentially request further information.

Sufficient time should be allowed within the plan for any model changes required as a result of challenge from the Board.

## Benefits

- Efficiency and effectiveness.
- Encourages active involvement in the process by Board members.
- Ensures Board input can be effectively acted upon.

# Board engagement



## Key principles

**Be relevant:** Focus on the objective of the Board paper, the key points in relation to materiality/proportionality, and keeping the presentation as concise as possible.

**Be engaging:** Different Board members may prefer different presentational styles. Try to adapt to individual preferences and roles, or/and consider other ways of engaging with the Board (e.g. individual meetings).

**Sign-posting:** Identify what area/topic of the Internal Model is being discussed at the start of the Board paper, bearing in mind the different roles of Board members.

**Be consistent:** Use consistent risk language and management information where appropriate, to avoid confusing the Board.

**Actively seek discussion/challenge:** Look for different ways to actively encourage Board discussion and challenge.

**Accurate, timely & comparable:** Ensure Board papers, presentations are accurate, timely and comparable to avoid the Board losing confidence.

*“There are various ways to encourage Board engagement including: involving the Board in defining the scope of Internal Model validation; requesting challenge in terms of the weaknesses and limitations of the model; and asking for their opinion on key areas of expert judgement.”*

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## What is it?

The level of Board engagement is, to a large extent, driven by the actual style and form of what is presented which is what we consider here.

Presenters to the Board should always remain aware of the different roles of individual Board members, with respect to the internal model, when producing papers or/and presentations. It may be more beneficial to have individual sessions with Board members to ensure they are appropriately briefed. Confer with Appendices B and C, which provide a number of examples.

There are various ways to encourage Board engagement including: involving the Board in defining the scope of Internal Model validation; requesting challenge in terms of the weaknesses and limitations of the model; and asking for their opinion on key areas of expert judgement. Actively looking for engagement and building upon it often builds Board confidence and encourages engagement from all the Board.

More specific ways to engage Board members include:

- Telling the full “story” – i.e. the overall modelling process
- Avoiding abstract concepts and inconsistency
- Ensuring appropriate time is available
- Encouraging questions: e.g. (PRA questions that they believe NEDs should be able to answer - see Appendix A).
- Individual Board members give briefings on their areas of focus
- Including interactive sessions to creative active participation by all members

# Board engagement (cont)



More detailed training considerations include:

## Inclusiveness

The complicated nature of the model and the modelling process make it essential for the Board to be consulted throughout the whole range of modelling activity, from the choice of parameters and assumptions through to the use of the results. This will require a series of discussions with the Board and allowance for questions and answer sessions.

## Individual attention

Different Board members will need different types of engagement. After the initial training sessions, it is important to allow time for individual questions and answers, and a series of one-to-one sessions as required, based on feedback from such questions.

## Communication of technical detail

It is recognised that much of the modelling activity is technical in nature, and there is neither the time, nor need, to communicate the full level of detail to Board members. However indications of model inputs and outputs can often be displayed graphically. This type of presentation, when allied with appropriate feedback sessions can enable a sufficient level of technical understanding to be relayed.

It is also important to report at a level that reflects confidence in the modelled results. For instance, it would be misleading to report results to 3 decimal places where data is sparse and/or confidence in the aptness of the model is in question.

## Time

Whilst this aspect is already implied in the above comments, it cannot be over-emphasised how a complicated and relatively new means of supporting the decision-making process needs to be discussed and absorbed. This will not happen immediately, but will emerge over time, with the right support. Constant reinforcement of training and key messages is also needed.

## Reporting

As part of the Board's involvement with the internal model, they will be regularly supplied with reports produced with internal model input, such as the internal model validation report and ORSA reports. When the Board is considering these reports it may be useful for technical specialists to be on hand to describe how the model has been utilised and receive feedback on how the model could assist in improving reporting.

## Benefits

- An engaging style of communication with the Board will aid good understanding as well as encouraging stronger challenge.
- Ensuring that information is relevant to the needs of the Board will avoid disengagement.
- Discussion amongst the Board will allow those who are less aware of how the model functions to gain from the knowledge from those who are.
- A recognition by Board members of the complexity and differences in modelling inputs and outcomes through an appropriate level and type of engagement
- Tailored approached to different Board members based on their backgrounds and experience

# Resourcing



## Key principles

**Link to communication plan:** If the communication plan is inclusive, it will usually be best to use this to ascertain resourcing requirements.

**Board training:** Resources for this may come from across the firm and externally. The company secretary and HR may also be involved.

**Planning:** This will usually involve the company secretary, but with input from across the various functions/departments.

**Technical & presentation skills:** Consider who are the best people to produce and present the technical content, as opposed to those carrying out the analyses. The best option is a combination of technical and presentation skills. It may be necessary to consider what combination of people and/or training is necessary.

*“Presenting and producing Board papers is a different skill set from technical specialist knowledge and so it maybe necessary to train specialists or use a combination of different people to produce the right outcome.”*

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## What is it?

Board training, managing the Board communication plan, producing technical papers and presenting to the Board, and ensuring there is feedback from the Board takes a significant amount of resource from across the business. Resourcing is therefore a key component of any good Board communication setup.

It is important to ensure that the right capabilities and experience exist and are available. Presenting and producing Board papers is a different skill set from technical specialist knowledge and so it maybe necessary to train specialists or use a combination of different people to produce the right outcome.

Given these resources are normally in high demand and sometimes from various parts of the business, it is important to prioritise their time appropriately.

## Benefits

- Proper resourcing should ensure that communication of the model to the Board does not cause a strain on other business areas.
- Duplication of effort can be avoided by ensuring that proper roles have been agreed in advance.
- The Board’s time will be more efficiently utilised by using good communicators from the technical teams.

# Appendix A

## Key questions for NEDs to ask

### Model scope

- Why does the firm want internal model approval?
- What is the scope of the firm's internal model - what risks/entities does it cover/not cover?
- Where risks are not captured in the internal model, are they dealt with adequately in the firm's ORSA?

### Key features of the model

- What are the model's key strengths, weaknesses and limitations?
- Where does the model work well/work badly?
- What are the key assumptions that underlie the model? How has the Board been involved in assessing these?
- How sensitive is the model output to these key assumptions? ("What moves the dial?")
- Does the output of the model give a credible answer?

### Use of the model

- For what purposes does the firm use (or plan to use) the internal model? Possible examples include:
  - Capital planning (e.g. future dividend capacity)
  - Risk appetite setting and monitoring
  - Pricing
  - Reinsurance decisions
  - Mergers & acquisitions

## Validation

- Has the Board been involved in agreeing the design of the validation work?
- Who has independently reviewed the model apart from the model developers?
- What were the key conclusions of the last validation report?
- Does the validation report give the Board a good summary understanding of the key strengths/weaknesses/limitations of the model and whether it meets Solvency II requirements?
- Is the Board tracking actively how key validation issues are being addressed?

## Ongoing review

- How will the Board review ongoing model appropriateness (e.g. as the business changes, or as new risks or data emerge)?
- How will the Board be involved in decisions on major changes to the internal model?

## Other

- What feedback has been given previously by the PRA and how has this been addressed by the firm?
- What contingency plans exist if model approval is not granted? Can the firm survive on the Standard Formula or would it need to take other mitigating actions?

Source: PRA, 19 March 2015, Non-executive directors in Solvency II.

# Appendix B

## Top-down Reasonableness tests

This appendix provides examples of reasonableness tests on the final SCR, without the need for a full understanding of how the model works.

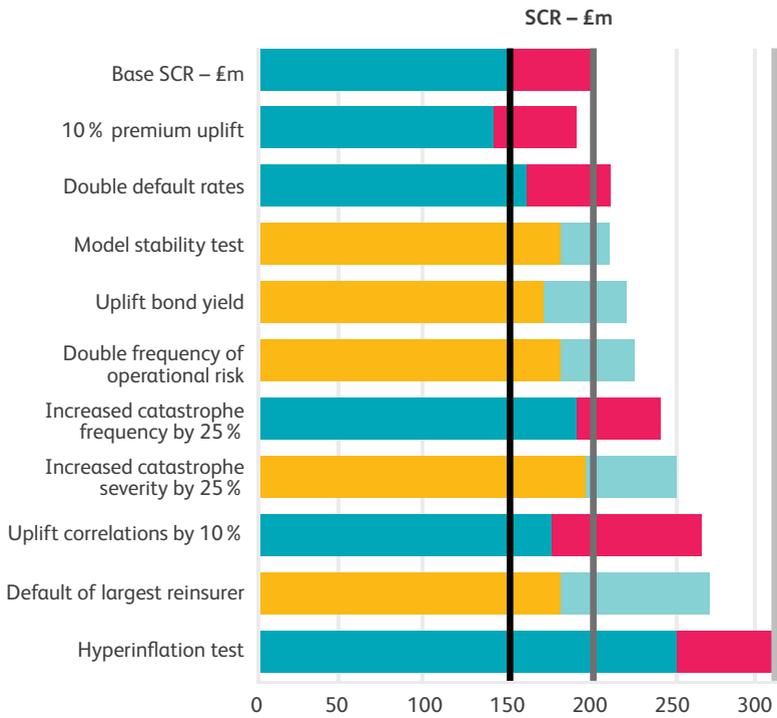
### Sensitivity tests

This example looks at sensitivity tests in relation to key areas of expert judgement, which can help the Board understand the potential variability in these judgements and their impact on the final SCR. These outcomes can then be compared with the calculated “capital adequacy band” of the company. The chart clearly shows a breach of the chosen capital adequacy level for the hyperinflation test, which was selected as having a likelihood of occurring once every 200 years.

This example shows sensitivities as at September and December, as well as on a ‘1 year’ and ‘ultimate’ basis. Showing different bases on the same graphic allows the Board to compare and contrast sensitivities between quarters/bases.

**Key**

- Ultimate SCR Dec
- Base Ultimate SCR
- 1 year SCR Dec
- Base 1 year SCR
- Ultimate SCR Sept
- Held Capital
- 1 year SCR Sept

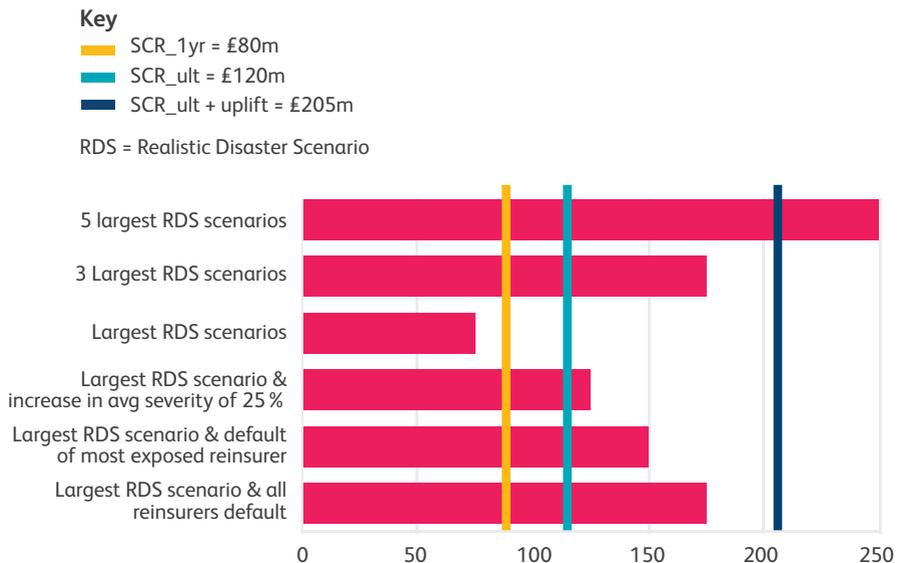


# Appendix B

## Demonstrating the impact of multiple events through scenario analysis

The Board will usually already have a good understanding of the firm's exposure to particular catastrophe events such as windstorms or earthquakes in certain areas of the world. However, the occurrence of several of these events at a similar time could have unexpected consequences for the firm which are not immediately clear from considering the events in isolation. For example, the Board may be clear on the consequences of the failure of a reinsurer or a Japanese earthquake, however a Japanese earthquake may increase the firm's dependence on the solvency of a reinsurer at the same time as the reinsurer is seeing increased numbers of claims. Clearly the use of the internal model can be helpful in the identification and illustration of these connected events, but as well as aiding the Board's understanding of risk these scenarios can allow the Board a greater understanding of how the model itself functions.

Another important aspect of this approach is the ability to communicate reasonable expectations for combinations of events in a stressed situation. For instance it may be possible for two or even three events to occur simultaneously, but four or more may be beyond the bounds of consideration for "normal" insolvency outcomes.

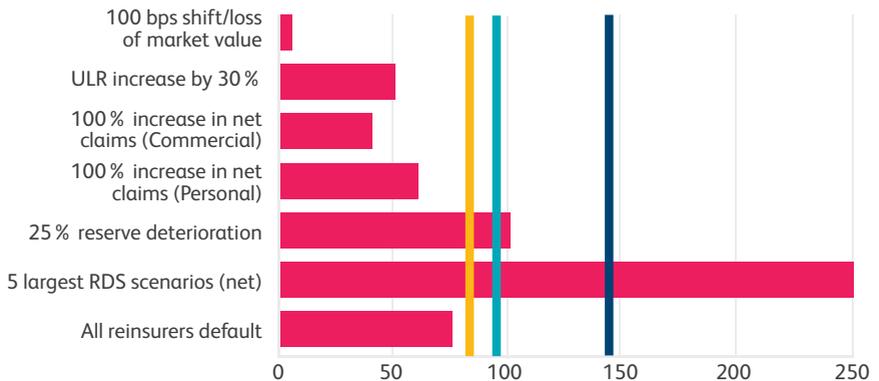


## Showing the impact of both stress and scenarios tests

Stress and scenarios can be shown on the same graphic, for inclusion within an executive summary for example.

### Key

- SCR\_1yr = £80m
- SCR\_ult = £95m
- SCR\_ult + uplift = £145m



# Appendix C

## Bottom-up Explanation

### Risk Segmentation

The first step to understanding any risk model is to understand at what level risks are being modelled.

The example in this appendix has six risk segments: Attritional claims; Large claims; Catastrophe claims; Interest rate risk; Currency risk and Equity risk. In reality this segmentation may be very large, but it is important for the Board to still have an understanding of this segmentation and how it differs from other modelling exercises e.g. reserving, business planning, pricing.

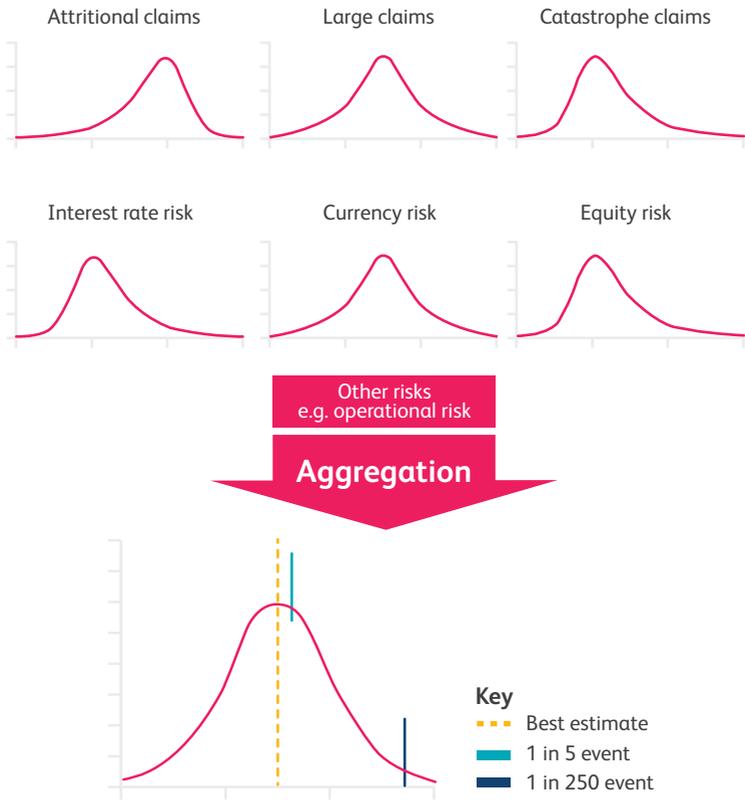
### Individual distributions

When discussing the modelling of risks there are two approaches that one can take to describing risks; a probabilistic approach will describe modelling in terms of the distribution used and the features of that distribution, for example the variance, skewness, or tail length; whilst a likelihood approach will focus on specific events and the likelihood that these will occur. A probabilistic approach fits naturally with the output given by an internal model, however most people will find a likelihood approach more intuitive. Therefore, when communicating the model to the Board, it may be useful to produce illustrative examples and explain the likelihood of these occurring in the model. Once the board understands how to interpret distributions, the derived claims distributions can be introduced.

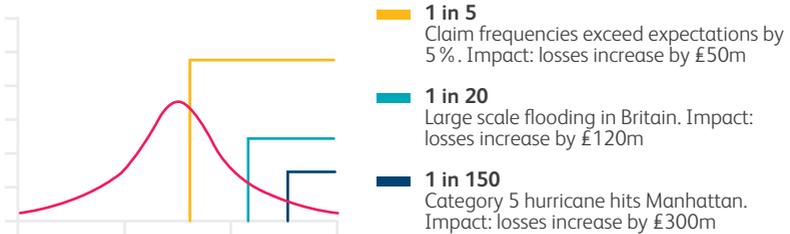
### Aggregation

Aggregation of the individual risk component distributions into a single overall distribution for the firm, is an important and material aspect of any capital model given it is trying to model the 'pooling of risk' upon which insurance is based.

The statistics involved in aggregation is very complex and so consideration of the outcomes of the aggregation process is often seen as the best way for Boards to become comfortable with the final distribution at various points on the curve (or percentiles, or confidence levels).



# Appendix C



Breakdown of losses				
Simulation	ΔBE	Cat	Large	Attritruonal
99499	£200m	£170m	£10m	£20m
99500	£200m	–	£110m	£90m
99501	£200m	£50m	£5m	£145m

An important aspect of the communication of modelled results is the need to express them in terms of a relatively small number of factors, or “key drivers” of model outcomes. This would assist in guiding the Board to consider the aspects which are most important, as there may be a risk of the Board struggling to tell the “wood from the trees” if they are asked to consider every feature of the model. In the example above, the key drivers have been labeled as Cat, Large and Attritruonal.

Considering a specified confidence level, e.g. 99.5%, individual simulations can be summarised for the Board since they will be most interested in the tails of the distribution where the extreme events will lie. These are clearly the most interesting events from a solvency management perspective: albeit that there is also likely to be strong interest in more “accessible” areas of the distribution – e.g. 1 in 4 or 1 in 10 events. The above table demonstrates one way to show this by showing the 99500th worst simulation, and those immediately around this, assuming 100000 simulations have been run. This approach is taken since many of the extreme events will each have a similar financial impact on the company but the events themselves can be very different. For example much worse than expected experience across a portfolio and a large catastrophe event could both cause insolvency, but the risk management actions for each of these would be very different.

# Appendix D

The Royal Commission, looking into the reasons behind the insolvency of HIH, Australia's second largest general insurer at the time, identified a number of individual and broader market actions to minimise the risk of a further such disasters.

One action was the introduction of a Financial Condition Report as a regulatory requirement. The Approved Actuary was tasked with producing the FCR on an annual basis.

Actuaries quickly realised that, although the scope of the FCR was substantially beyond the typical existing role of the actuary in the market, the risk to the profession could be significantly mitigated by allying the FCR to output from internal modelling activity.

The main aim for the FCR was to provide the members of the Board of general insurance firms with the tools to assist their governance, with a key focus on current and forthcoming "risk balance sheets".

Early examples of the FCR were met with a generally positive reaction from both executive and non-executive members of Boards. However, communication of modelling activity and outcomes tended to be detailed and not really tailored to the audience. There was also a tendency to report on the "finished article" and hence not give Board members much opportunity to feel a sense of ownership of the model and model activity.

Later, lessons were learned from these initial communication lapses. There was more briefing at Board level of the scope and use of the modelling activity and hence how the model fitted into the overall description of financial condition. Also there were better attempts to communicate through graphical explanation and the development of "key performance indicators" (KPIs) that helped Board members to keep abreast of financial condition from year to year.

These KPIs included the chance of a loss-making year, the chance of regulatory failure (or other key measures related to regulatory intervention and more granular measures, such as the probability of loss ratios above a certain level for key business areas.

This is now a key document in the Australian GI market. KPIs are still used to help with communication and engagement of Board members, but a more balanced approach is now used, with Board advice being used as part of the input to modelling activity and a continuous dialogue is maintained between decision-makers and modellers.

# Appendix D

## Reporting examples

The FCR has helped encourage a range of model-related reporting activities. Examples include reinsurance programme selection and asset/liability management. In both cases an “efficient frontier” can be demonstrated for the choice of (a) the outwards reinsurance portfolio and (b) the assets to support the liabilities of the business. In both cases actual options for (a) reinsurance coverage and (b) an asset portfolio can be demonstrated in reference to the frontier, dependent on the risk/cost changes for the insurer.

### Who and when

General insurers in Australia from May 2005 (prompted originally by demise of HIH; the 2nd largest Australian general insurer at the time).

### Objective

Provide the financial “storyboard” for current and future balance sheets. Arguably the output of internal modelling (or, at least, internal risk discipline) in action.

### Initial fears

Possible inability to find expertise to complete reports (quantity and quality).

### Board response

Almost 100 % positive (“The first time I’ve seen the full story told”: NED).

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## The internal model industry forum

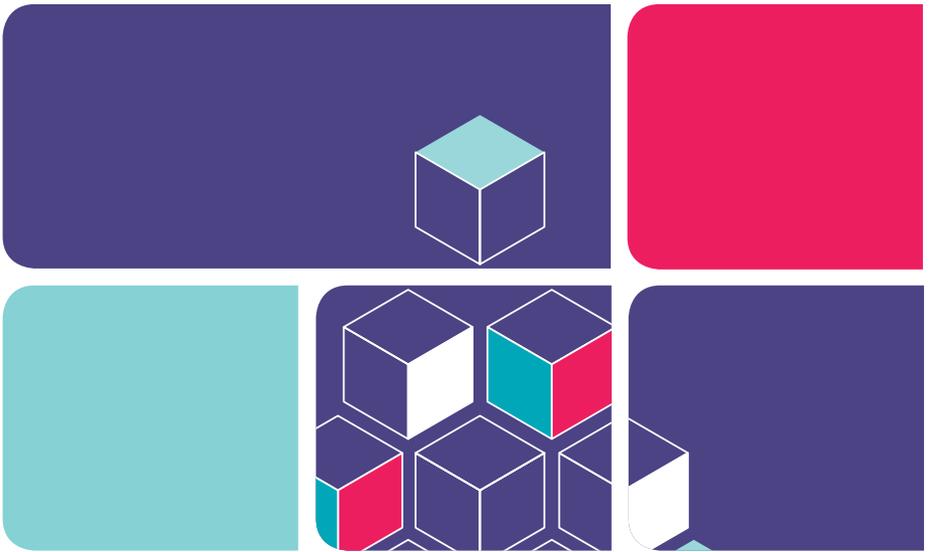
This document has been produced by the Internal Model Industry Forum (IMIF). The IMIF was set up by the IRM in 2014 to address the key questions and challenges that insurers face with the use and validation of internal risk models and to work in a collaborative way to develop and share good practice to ensure that these models add value to the organisation as well as supporting regulatory compliance. We now have over 300 members and have organised a series of Forum meetings to explore key issues. We have research being undertaken by a number of workstreams and aim to publish the results along with other useful resources and guidance.

**More information about the IMIF and its work can be found on the IRM website [www.theirm.org](http://www.theirm.org)**

## Who are the IRM?

This work has been supported by members of IRM, which has provided leadership and guidance to the emerging risk management profession for over 25 years. Through its training, qualifications and thought leadership work, which includes seminars, special interest and regional groups, IRM combines sound academic work with the practical experience of its members working across diverse organisations worldwide. IRM would like to thank everyone involved in the IMIF project.





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## Our supporters

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