CRO Guide to Solvency II
The journey from complexity to best practice

October 2012
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Introduction

The Chief Risk Officer (CRO) is accountable for driving the success of an insurance company’s journey towards Solvency II implementation. With responsibility across the three pillars, the role is crucial in shaping his or her business to be successful under the new regime. Further, the CRO connects and collaborates with the roles across an insurance company—from board to actuary or catastrophe modeller—that are involved in achieving and embedding regulatory compliance.

The challenge for the CRO in today’s environment of economic and regulatory uncertainty is to invest resources carefully and prudently to enhance risk management capabilities in synergy with the expected requirements of Solvency II.

Our last annual Solvency II publication ‘Solvency II Revealed’ addressed new ways of thinking about some of the more technical regulatory challenges under Solvency II and presented practical solutions. A year has now passed and, while some further detail has been provided in the draft Level 2 text, deadlines have been missed and a great deal of uncertainty exists about the final implementation date and form of the proposed regulation.

This year’s focus is to provide a higher level view of the current Solvency II landscape and highlight the key areas where the Chief Risk Officer and senior management should focus their attention during the remaining period before implementation. Equally, all insurance company professionals involved in Solvency II can benefit from the insight to help better understand the demands of the CRO and how to optimise the flow of information to the board level.

The publication is structured around the three pillars of Solvency II under the themes of capital management, risk management and data quality. Within each topic a number of short articles highlight some of the key challenges firms face, setting out best practice to overcome these hurdles in the most effective way.

The following topics are explored from the perspective of maximising value added for the insurer or reinsurer while ensuring regulatory compliance.

- **Capital planning under Solvency II**: Understanding the drivers of the Solvency II capital requirement and how to maximise capital efficiency for the enterprise.
- **Internal Model**: Achieving regulatory approval for the internal model requires demonstrating a strong understanding of the model design and suitability, a robust governance system and core applications in the business supported by senior management.
- **Own Risk and Solvency Assessment (ORSA) and risk management**: The second pillar of Solvency II is designed to ensure that all insurers and reinsurers embed strong risk management principles in the running of the business. Successful implementations of the ORSA will help firms enhance their business strategy by targeting opportunities that maximise risk-adjusted profitability and are accretive to return on equity.
- **Optimal group structure**: Solvency II is a complicated regulatory system and requires significant compliance resources for every entity in a group. How should a group structure its business under Solvency II to avoid duplication of compliance functions and maximise group capital efficiency?
- **Data quality and governance**: Data underpins every aspect of an insurer’s business and poor data systems can destroy value for the enterprise. Solvency II sets standards and governance requirements which can be leveraged to enhance the quality of decision making and improve the use of an Internal Model.

Aon Benfield is committed to supporting insurers and reinsurers through the Solvency II journey. The firm’s Solvency II capital solutions span across Aon plc, drawing upon the strengths of Aon Benfield for reinsurance optimisation, Aon Hewitt for investment advice and Aon Benfield Securities for capital raising and corporate strategy. In addition, Aon Benfield’s consulting firm Inpoint supports insurers and reinsurers with advisory services that provide comprehensive coverage of the three pillars of Solvency II and, in particular, capital modelling and model validation expertise.

Maintaining a competitive position and financial strength under Solvency II are key goals for any CRO and this report aims to unravel the complexities of Solvency II and provide practical advice on the journey to a successful implementation.
Pillar 1
Capital Planning: Best Practice Under Solvency II

Overview
Solvency II introduces risk-based capital charges for insurance companies across Europe. Firms that have assessed their risk appetite under the new regulations may need to alter their business strategy in order to achieve the level of capitalisation or Solvency II ratio they deem appropriate. This article will consider the different “levers” of Solvency II capital and how to design the optimal strategy to achieve their target level of capitalisation. For example, a non-life insurer may aspire to maintain a 150% Solvency II ratio over the next three years while, at the same time, their business plan is to grow premiums by 25%. What steps are required to meet the business plan while simultaneously meeting their capital targets?

Key Challenges
Under Solvency II capital must be held to support all the risks to which the balance sheet is exposed. This includes non-life, life and health insurance as well as other balance sheet risks such as market, counterparty and operational risk. Diversification credit is provided between some risk groups. Capital may be measured using the Standard Formula, a full Internal Model or a combination of the Standard Formula and a partial Internal Model. The key levers of Solvency II capital are identified by considering the key components of the Solvency II ratio, the ratio of available to required capital. In Exhibit 1 we show the different components of the Solvency Capital Requirement (SCR) and in Exhibit 2 the relative sensitivities of each component on the overall SCR.

Exhibit 1: Sample exhibit of Aon Benfield’s Solvency II Dashboard showing breakdown of Solvency II capital

| Source: Aon Benfield |
In devising the firm’s strategy for capital planning, the following key challenges need to be considered:

- Should business strategy be altered to reflect the capital requirements of Solvency II or should the firm identify ways to make Solvency II ‘fit’ the needs of the business?
- How can a mono-line insurer maintain a competitive position without the diversification credit enjoyed by large insurers?
- What is the optimal reinsurance strategy to maximise capital efficiency across lines of business and risks? Does retrospective reinsurance have a place to improve the firm’s use of regulatory capital?
- Why do competitors make use of capital market solutions such as contingent capital in place of traditional reinsurance? When can non-traditional solutions improve capital efficiency?
- How can the firm’s business strategy be incorporated into capital planning to achieve the target Solvency II ratio over the business planning cycle?
- What is the optimal mix of underwriting, reserve and market risk for the organisation? How should the view of capital efficiency tilt the portfolio allocation relative to risk and reward?

### Exhibit 2: Sample exhibit of Aon Benfield’s Solvency II dashboard showing a Solvency II sensitivity analysis

<table>
<thead>
<tr>
<th>Multi-line PLC</th>
<th>Risk Value</th>
<th>% / Total</th>
<th>Marginal Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non Life</td>
<td>102,673</td>
<td>56%</td>
<td>91%</td>
</tr>
<tr>
<td>Life</td>
<td>7,089</td>
<td>4%</td>
<td>19%</td>
</tr>
<tr>
<td>Health</td>
<td>11,289</td>
<td>6%</td>
<td>21%</td>
</tr>
<tr>
<td>Default</td>
<td>16,217</td>
<td>9%</td>
<td>62%</td>
</tr>
<tr>
<td>Market</td>
<td>46,496</td>
<td>25%</td>
<td>60%</td>
</tr>
<tr>
<td>Total</td>
<td>183,763</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Source: Aon Benfield

### CRO Spotlight

Successful capital planning is a key indicator that an insurer’s management is well placed to generate attractive shareholder returns post-Solvency II. It is important to understand the marginal sensitivities of the Solvency Capital Requirement to each underlying risk factor. This helps the management to maintain a holistic view of their business and target their capital strategy to those levers that have the highest impact for the Solvency II ratio. Every CRO should aim to know which risks drive 90% of the capital consumption of the organisation and how he/she can influence these risk parameters and the capital consumption through risk mitigation solutions, such as reinsurance.
Solutions
Capital planning solutions vary according to the type of firm and circumstances. The key factors that differentiate between appropriate strategies are:

- Capital measurement (Standard Formula, partial or full Internal Model)
- Underwriting expertise (mono-line, multi-line or composite insurer)
- Appetite for investment risk relative to insurance risk
- Level of existing capital redundancy under Solvency II

It is important to consider a holistic view of the firm in devising the optimal solution for capital planning. For example, this can be achieved by developing a modelling framework that includes the risk, capital and return associated with different classes of business (life, health and non-life), along with market and counterparty risk. Using this framework, informed decisions can be made about the optimal capital strategy that meets the needs of the business over the full business planning cycle, while satisfying the risk appetite and capital budget under Solvency II.

The development and application of this holistic risk-return-capital framework is a key stage for every firm that has embarked on the Internal Model route. It is this essential use of the Internal Model that demonstrates to the regulator that the Internal Model has the support of senior management and is truly embedded into the business. The Internal Model provides stochastic scenarios representing the possible outcomes in the future for different insurance classes, asset returns and other balance sheet risks. These scenarios contain all the information necessary for capital planning under Solvency II: risk, return and capital. Using stochastic optimisation techniques the output of the Internal Model can be harnessed to select business strategies that achieve the capital needs of the firm while satisfying multiple bespoke risk and return constraints.

For firms that are working under the Standard Formula, there are tools such as Aon Benfield’s Solvency II Dashboard, which can be used to identify capital inefficiencies in the existing business strategy. This provides a comprehensive analysis of the firm’s capital requirements under the Standard Formula. The overall Solvency II ratio is provided alongside a breakdown of the capital charges across all risk categories, including catastrophe, premium and market risk. Sensitivities are provided that quantify the overall capital requirement corresponding to a EUR1 change in any underlying risk factor (at the full granularity of the Standard Formula).

The optimal capital strategy will help the firm achieve its business goals while achieving an attractive risk-adjusted return and return on equity within the constraints of Solvency II.
Standard Formula Versus Internal Model: Key Decision Factors

Overview
An important decision point for firms is how to measure capital under Solvency II: either to rely on the Standard Formula’s prescriptive approach or to develop a partial or full Internal Model. Both methods have their relative advantages and the best solution will depend on the firm’s individual circumstances. This article outlines key decision points and recommended steps to ensure successful capital measurement under Solvency II.

A common perception is that building an internal model enables a firm to hold less capital relative to those firms relying on the Standard Formula. In general, this is a fallacy and it is important to understand the drivers of capital under the Standard Formula and Internal Model in order to make an informed decision about capital measurement. In Exhibit 3, we compare the drivers of required capital under the Standard Formula and Internal model.

Exhibit 3: Comparison of Standard Formula versus Internal Model

<table>
<thead>
<tr>
<th></th>
<th>Standard Formula</th>
<th>Internal Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profitability</td>
<td>100% combined ratio assumed.</td>
<td>Credit given for expected future profits.</td>
</tr>
<tr>
<td>Non-life Insurance Risk Parameters</td>
<td>Standard parameters prescribed, can be overridden by Undertaking Specific Parameters (USP) with sufficient historical data (&gt; 10 years). Penal risk factors for writers of non-proportional reinsurance or non-EEA exposure.</td>
<td>Custom distribution calibrated to own data and industry data. No specific historical time window requirement.</td>
</tr>
<tr>
<td>Life Insurance Risk Parameters</td>
<td>Longevity risk assumed to be (permanent). 20% decrease in mortality at all ages</td>
<td>A stochastic model of mortality allows recognition of age distribution of policyholders and hence more representative capital charge.</td>
</tr>
<tr>
<td>Reinsurance</td>
<td>Full credit for catastrophe reinsurance and proportional reinsurance. Non-proportional reinsurance assessed using USPs or Non-Proportional Adjustment factor. Limited allowance for Adverse Development Covers. Stop-loss or aggregates receive limited recognition.</td>
<td>Better recognition of non-proportional reinsurance based on economic model.</td>
</tr>
<tr>
<td>Asset Risk Parameters</td>
<td>Prescribed instantaneous economic stresses, cannot be customised but allowance for risk mitigation techniques.</td>
<td>Use of economic scenario generator permitted to reflect risk in actual investment strategy. May be beneficial for low risk exposure in Other Equity category.</td>
</tr>
<tr>
<td>Correlation</td>
<td>Prescribed correlation parameters, cannot be overridden.</td>
<td>Correlation and degree of tail dependency modelled using own and industry data.</td>
</tr>
<tr>
<td>Operational Risk</td>
<td>Prescribed shock that is equivalent to approx 8-10% of SCR (EIOPA QIIS Report).</td>
<td>Custom loss distribution based on insurance industry based operational risk database and own exposure information.</td>
</tr>
</tbody>
</table>
Clearly there are a range of factors that will determine the relative capital requirement between the Standard Formula and an Internal Model for an individual firm. For example, a smaller sized insurer writing only motor insurance that has experienced a combined ratio around 100% does not benefit from the profitability element of the Internal Model. Due to smaller premium volumes than the market average, the insurer is likely to experience higher volatility than the market average used by the European regulator to calibrate the Standard Formula parameters. Conversely, a mono-line credit insurer that maintains a stable combined ratio well below 100% and experiences lower than market average volatility would expect to hold less capital under an Internal Model.

Key Challenges

Internal Model Feasibility

The decision on whether to adopt the Standard Formula or to develop a full or partial Internal Model depends on many factors and goes far beyond the level of required capital. The first consideration is the environment in which the firm operates and the nature of the business. Key factors that should be carefully considered include:

- **Domicile of firm:** While Solvency II is intended to create a level playing field, not all regulators have equal resources. In the early years of Solvency II, the local insurance supervisors are focusing on larger insurers and those perceived to have higher priority for use of an Internal Model. Therefore, before deciding to proceed with an Internal Model, it is important to discuss plans with the regulator and understand the likelihood of gaining model approval within the timescales required by the business.

- **In-house capabilities:** While many aspects of the Internal Model can be supported by external parties, the Internal Model needs to be ultimately owned by the management and personnel of the insurance company. The firm should be comfortable in making the investment required to embed use of the Internal Model into important business processes, such as underwriting strategy, reinsurance strategy and business planning. The additional step to move beyond using the model purely for capital setting requires significant commitment from senior management to undertake appropriate training and invest in Solvency II experts who are responsible for the ongoing use of the model in the business.

CRO Spotlight

Solvency II offers a flexible approach to capital measurement and it is important to carefully identify the capital treatment that will best fit an organisation. Using an Internal Model enables the Solvency II capital requirement to be customised to better reflect the unique characteristics of a business. It is not suitable for all firms and undertaking a feasibility study is recommended to gain a better understanding of whether it could be beneficial.

- **Nature of risks:** The key motivation of an Internal Model should be to better capture the risks in the business and therefore it is more appropriate when it is clear that certain aspects are not well represented by the Standard Formula. Using an Internal Model should be a natural evolution for the company rather than being driven by regulatory factors.

Having established that an Internal Model is appropriate for the firm, given the operating environment, the next stage is to identify the scope. This can be as narrow as a single line of business, subject to “cherry picking” requirements under a partial Internal Model, or as wide as all business classes and balance sheet risks under a full Internal Model. Finally, the firm should consider the financial commitment required to develop, validate and embed an Internal Model into their business.

Standard Formula Usage

For firms that decide to adopt the Standard Formula for capital setting (and Internal Model-based firms as part of the validation process), it is important to understand how the Standard Formula can be customised to better reflect the business. There are several areas in which more careful application of the Standard Formula can provide beneficial capital treatment:

- **Undertaking Specific Parameters:** For non-life insurers, the premium and reserve risk factors can be customised to reflect the firm’s historical experience. This is an
important half-way house between a partial Internal Model and the Standard Formula, for which a less onerous approval process is required.

- **Reinsurance treatment:** The use of reinsurance to mitigate the 1 in 200 year scenario is a powerful means of managing capital under the Standard Formula. Careful application of reinsurance can substantially reduce the capital requirement.

- **Other risk mitigation techniques:** Most forms of risk mitigation that protect the firm’s balance sheet against instantaneous shocks are recognised under the Standard Formula. This includes financial derivatives to protect against asset risk and capital market instruments such as contingent capital that will act to absorb losses.

**Solutions**

Most firms have already entered the pre-approval process with their insurance supervisor, but it is never too late to move to an Internal Model solution. It is recommended that companies conduct a feasibility analysis to consider the suitability of using an Internal Model and to identify gaps where the existing practices and skill-sets require improvement. The feasibility study should also estimate the capital benefit that might be expected by moving away from the prescriptive elements of the Standard Formula.

For those firms not using an Internal Model, it is important to have a strong plan in place for the Standard Formula. For Internal Model-based firms, a contingency plan is important where the business can operate under the Standard Formula in the case that Internal Model approval is not obtained in time for the start of Solvency II. The next article explores how firms can work under the Standard Formula.
Contingency Planning Under the Standard Formula

Overview
For firms that have decided to build an Internal Model, it is important to consider the implication for the business if approval is not achieved within the timescales for capital setting at the inception of Solvency II.

Why should this be a significant issue for firms? As discussed in the previous article 'Standard Formula Versus Internal Model', for many firms the choice of the Internal Model for capital measurement is driven by the Standard Formula not providing an accurate representation of the risks faced by the business. Therefore, use of the Standard Formula may result in capital charges much higher than expected and/or inadequate credit being given for risk mitigation techniques (for example, reinsurance arrangements not recognised fully by the Standard Formula or investment hedging strategies subject to gap risk (intra-day movements in market prices)).

As such, a sensible and prudent measure is to consider the impact of running the business under the Standard Formula for a temporary period before approval is attained for the Internal Model. This will reduce the level of dependency on the local supervisor for model approval while maintaining sufficient capital adequacy.

Key Challenges
The firm should conduct a strategic review of its capital adequacy under the Standard Formula. This should not simply be an update of the last completed Quantitative Impact Study 5 (QIS 5) spreadsheet with the latest financials but should (i) reflect changes to QIS 5 provided in the Level 2 text, (ii) include full application of techniques available to customise the Standard Formula, and (iii) identify risk modules for which the Standard Formula requires significantly higher capital than the Internal Model. Some of this analysis forms part of the validation process for Internal Models.

Key challenges in applying the Standard Formula for Internal Model-based firms include:

- Lines of business running at substantially lower than 100% combined ratio
- Premium or reserve risk where the Internal Model assumption for risk (in particular the 1 in 200 year scenario) is substantially lower than for the Standard Formula
- Proper treatment of catastrophe risk under the Standard Formula and accurate application of catastrophe reinsurance
- Obtaining full recognition for some types of non-proportional or aggregate reinsurance treaties
- Financial risk mitigation techniques that do not protect against instantaneous shocks

Solutions
As part of the contingency planning under the Standard Formula, a strategic review of the firm’s capital adequacy is recommended to identify problematic areas. The results of the review may be shared with the relevant areas of the business. For example:

- The reinsurance manager can be tasked with reviewing the adequacy of the current treatment of reinsurance under the Standard Formula and identifying alternative temporary reinsurance solutions that can be applied.
- The actuarial team can investigate whether the calibration of the non-life premium and reserve risk for the Internal Model can be transposed to the Standard Formula using Undertaking Specific Parameters.

The investment team or external manager can identify alternative investment strategies or hedging mechanisms when the Standard Formula requires substantially more capital.

Once the use of the Standard Formula has been optimised and is customised to the firm’s risk profile as far as is appropriate and permitted, there may still be capital deficiencies to address. Here the firms should consider the different levers of capital under the Standard Formula to determine an appropriate strategy. Whether or not to implement the contingency plan depends on how confident the firm is in obtaining approval. In many cases the likelihood of approval is out of the control of the firm, for instance, where the local supervisor has limited resources and chooses to focus efforts on the largest insurance companies.

CRO Spotlight
It is important not to become complacent on the issue of Internal Model approval. Experience shows from the Swiss Solvency Test that despite substantial planning periods, regulators may not succeed in approving Internal Models before the start date of the new regulation.

Having a contingency plan in place under the Standard Formula is a sensible precaution that ensures continuity and protects external perception of the firm regardless of the Internal Model approval outcome.
Pillar 1 | Solvency II Ratio

Understanding the Drivers of Capital

Overview
For firms that have a capital shortfall relative to their target Solvency II ratio, either today or projected under the business plan due to expansion, measures should be identified that will correct the shortfall in the most cost efficient manner.

The Solvency II ratio is calculated by the ratio of available capital to required capital measured by either the Standard Formula or the Internal Model. As shown in Exhibit 4, there are three key levers that drive the Solvency II ratio:

- Insurance SCR
- Market risk (asset) SCR
- Level of surplus

Therefore, if the firm wishes to improve its Solvency II ratio, then the question is which lever will be more cost efficient?

Exhibit 4: Solvency II Capital Solutions

Insurance Company

<table>
<thead>
<tr>
<th>Available Capital</th>
<th>Required Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surplus</td>
<td>Asset SCR</td>
</tr>
<tr>
<td>Insurance SCR</td>
<td>Insurance SCR</td>
</tr>
<tr>
<td>Reinsurance Solutions</td>
<td></td>
</tr>
<tr>
<td>- Reinsurance solutions provide effective risk and capital management under Solvency II</td>
<td></td>
</tr>
<tr>
<td>- Lower cost than capital markets</td>
<td></td>
</tr>
<tr>
<td>- Solutions under Standard Formula and Internal Model</td>
<td></td>
</tr>
</tbody>
</table>

Investment Solutions

- Provide investment solutions for the insurance industry tailored to Solvency II
- Strategic asset allocation to reduce Solvency II capital requirement without compromising yield

Capital Solutions

- Range of debt solutions for Solvency II
- Access to insurance investors
- Strong track record in capital raising

Optimising the Balance Sheet to Meet the Requirements of Solvency II

Source: Aon Benfield

Key Challenges
The challenge insurers face is to identify, within the very granular structure of the Solvency II risk framework, which capital levers (i) provide the greatest improvement in the Solvency II ratio, (ii) can be utilised in a cost efficient manner, and (iii) fit within the business profile and strategy of the organisation. In setting investment strategy it is instructive to understand the relative capital efficiency of different asset classes. One approach for comparing the capital efficiency is to consider the return on capital achieved for each investment under current market conditions from a silo perspective (i.e. ignoring its contribution to diversification). This comparison can be helpful in identifying whether the existing strategy is overweight in less capital efficient assets.
Solutions

Identifying the optimal solution for an insurer is an involved process that can be described as a three stage process:

• Conduct a marginal capital analysis across risk modules of the Internal Model or Standard Formula. This will provide the reduction in overall capital requirements at the company level corresponding to a EUR1 reduction in the individual risk module’s silo capital requirement. Those risk modules that have the highest marginal sensitivities provide the most efficient ways to control the required capital of Solvency II.

• Filter the set of candidate capital levers to those which are within the core expertise of the firm. Consider the different mechanisms for mitigating the risk module’s silo capital requirement, for example, prospective reinsurance, retrospective reinsurance, modification of policy conditions, derivatives, management actions, premium volume.

• Compare costs and feasibility of different combinations of options within the strategic view of the firm’s business plan. Contrast the implied cost of capital with alternative capital market solutions, for example Tier 1 capital such as common equity and corporate debt, as well as Tier 2 and 3 capital including sub-ordinated debt and contingent capital. For firms who target a regulatory surplus, it is important to incorporate the leverage effect of reducing required capital. For example, consider a firm targeting a 150% Solvency II ratio with required capital of 100 and available capital of 150. Using reinsurance to reduce the required capital to 90 will result in a 17% improvement in the Solvency II ratio, compared to a 10% improvement if the available capital is increased to 160.

When performing this analysis it is important to have a strong insight into the reinsurance market, understanding the capacity and appetite of reinsurance markets to different risks. This enables the firm to incorporate likely market rates into the cost analysis. Without this realism it is easy to fall into the trap of proposing solutions that cannot be placed at reasonable cost. Similarly, it is important to incorporate expertise of the investment markets and capital markets into the analysis.

CRO Spotlight

Reinsurance remains the best mechanism for mitigating the risks and associated capital charges under Solvency II. Since most firms target a Solvency II ratio substantially above 100%, the effect of leverage on required capital makes reinsurance more cost efficient than raising additional equity.
Creating Value Through the Use Test

Overview
The Use Test is a key requirement that needs to be met in order to achieve Internal Model approval. One of the main aims of the Solvency II regime is to fully embed risk management within insurance firms. In order to satisfy regulators that this has been achieved, companies will need to demonstrate that model output is widely considered in decision making processes and that there is real business pressure driving model improvement on an ongoing basis.

Key Challenges
Most firms participating in the internal model approval process (IMAP) will already be considering model output and risk metrics in a number of areas. However, the key challenges many firms face include extending “use” to senior management level and effectively evidencing that the model is being widely used without creating a value-destroying documentation burden.

• Senior Management Engagement
Without senior management buy-in, it is unlikely that there will ever be sufficient business pressure to drive ongoing model improvement. In the current environment of information overload, it can prove difficult to introduce new inputs into decision making processes.

• Evidencing Use
In the absence of sufficient evidence, it will be very difficult for firms to demonstrate to the regulator that they have met the requirements of the use test. However, if internal documentation requirements prove too onerous, firms run the risk that either people will avoid using model output or, where model output is used, it may not be adequately documented.

Exhibit 5: Stakeholder Needs for Use Test

<table>
<thead>
<tr>
<th>Stakeholder needs</th>
<th>Principles</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use</td>
<td>Sponsors</td>
<td>Foundation Principle: The undertaking’s use of the Internal Model shall be sufficiently material to result in pressure to improve its quality.</td>
</tr>
<tr>
<td>Use</td>
<td>Sponsors</td>
<td>• Further principles describe embedding the Internal Model into the decision making process, risk management, senior management and ensuring it is suitable for the firm.</td>
</tr>
<tr>
<td>Use</td>
<td>Sponsors</td>
<td>Asset liability management</td>
</tr>
<tr>
<td>Use</td>
<td>Sponsors</td>
<td>Business planning / strategy</td>
</tr>
<tr>
<td>Use</td>
<td>Sponsors</td>
<td>Capital management</td>
</tr>
<tr>
<td>Use</td>
<td>Sponsors</td>
<td>Development and monitoring of risk appetite</td>
</tr>
<tr>
<td>Use</td>
<td>Sponsors</td>
<td>Efficient use of capital</td>
</tr>
<tr>
<td>Use</td>
<td>Sponsors</td>
<td>Investment decisions e.g. strategic, tactical</td>
</tr>
<tr>
<td>Use</td>
<td>Sponsors</td>
<td>ORSA</td>
</tr>
<tr>
<td>Use</td>
<td>Sponsors</td>
<td>Regulatory capital (SCR for solo and for groups)</td>
</tr>
<tr>
<td>Use</td>
<td>Sponsors</td>
<td>Reinsurance strategy and development of reinsurance programme</td>
</tr>
<tr>
<td>Use</td>
<td>Sponsors</td>
<td>Setting return on capital targets and remuneration</td>
</tr>
</tbody>
</table>
Solutions

One of the easiest ways to ensure senior management buy-in is to engage them early on in the model development and validation process. If heavily involved in both specifying what they would like to achieve using the model and the validation of the model output, senior management is significantly more likely to trust the model results and want to consider them in the strategic decision making process. To achieve this level of engagement, an element of training may be required in order to bridge the gap between the technicalities of actuarial modelling and the commercial issues with which senior management will be concerned.

Exhibit 6: Meeting the Use Test

In terms of efficiently evidencing use, the key is to design a standard suite of management information (MI) exhibits that provide decision makers with the full range of information they need to make well informed, risk based decisions. If designed well, standardised MI exhibits are efficient to produce, can be easily included in committee packs (implicitly evidencing use) and provide decision makers with a consistent and familiar set of risk metrics to consider for any decision.

CRO Spotlight

Making the link between optimising return on capital, managing the volatility of results and delivering within risk appetite is a good way to make senior management excited about using the results of internal models in strategic decision making.
## Operational Risk: Measurement and Management

### Overview

In recent years, the wave of operational failures and changes in the regulatory and economic environment has shifted the attention of firms and regulators towards the management of operational risk as one of the most significant risks organisations face. Many firms have charged ahead with developing their operational risk management and measurement capabilities but very few have managed to do it with real success. Firms are increasingly being put under pressure to revisit their risk strategy and framework to manage the operational risk for the business and support effective decision making.

Operational risk arises as a result of failures in people, processes and systems or external events. There have been several significant failures across financial services in the last decade caused by the uncontrolled actions of people. The losses incurred by banks in the trading room could feasibly occur in the underwriting team; the main difference being the length of time for the losses to emerge.

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### Key Challenges

Firms face many challenges when they look to strengthen their operational risk frameworks, which include:

- **Quality and Availability of Management Information**

  Good management information is essential for management to make effective and timely business decisions. However, the information reported to management is often inaccurate, incomplete, untimely and not relevant. There are also gaps in information which prevent management from monitoring their risk profile across all parts of the business and all risk types. Operational management is more than having a department with the name or that produces reports on risks. It requires a cultural shift in the organisation on how every employee thinks about the risks they are involved in.

- **Biases in the Firm’s Risk Profile**

  Most high-profile losses in recent years were due to circumstances that firms did not foresee or misjudged. Management’s view of their own firm’s risk profile can be biased, as risk discussions often tend to be centered around expected rather than unexpected risks.

- **Models for Measurement Rather than Management Purposes**

  Most organisations have opted for a simple calculation in order to define their capital requirements for operational risks (e.g. a percentage of gross income for banks). However, a number of organisations have developed their own internal capital model, but these models are often developed more for regulatory than for management purposes.

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### CRO Spotlight

Start adding value to the business by ensuring that operational risk management is developed for the purpose of helping to run the business better rather than for regulatory considerations. Accurate and complete risk information, as well as a good capital model and insurance mitigation programme, can really add value!
Solutions

In order to effectively manage operational risk, one of the most important requirements is to maintain the quality of the risk data. Management needs good information to have visibility on their business and make sound business decisions. Achieving data quality requires regular review and validation of the data by the business.

Where internal data is not abundant or sufficient, it is often useful to supplement it with external data such as external public and consortium information. There are differences in size and quality of these products and initiatives in the marketplace, but losses experienced by peer institutions are a useful source of information to establish a firm’s risk profile.

A robust scenario process, which draws on the knowledge and experience of business experts, is also a very useful tool to help management achieve a better understanding of their firm’s risk profile, in particular for the types of risks that might give rise to severe losses. If designed well, a good scenario process should primarily support management decisions and will be used to drive the strategy and the business planning process.

An internal capital model for operational risk enables the aggregation of risk information and metrics to support decision-making. Firms need to design models that make the best use of information available, either internally or externally, and can produce robust and stable outputs. A good model can also support the firm in optimising its insurance and risk finance programme for both profit and loss as well as capital management purposes.
The Validation of Expert Judgement in an Internal Model

Overview
It is widely acknowledged by both local supervisors and the European Insurance and Occupational Pensions Authority (EIOPA) that expert judgement will form a key part in insurers’ or reinsurers’ Internal Models. Application of expert judgement is a necessary method for the actuarial team to deal with data deficiencies. It is also a core element of the interpretation of good quality data that is central to the role of an actuary. For example in the UK, the actuarial profession is highly experienced in the application of expert judgement in models and through its Technical Actuarial Standards (TASs) there are existing governance principles in place in relation to its use and documentation.

Solvency II introduces validation requirements for expert judgement that are used to address:

- The appropriateness of the expert judgements used
- The completeness of the documentation
- The materiality of the assumptions in which expert judgement is applied, understood and communicated to the relevant decision makers
- The monitoring of changes in material assumptions where expert judgement is applied and that explanations are documented and communicated as to why changes have occurred (e.g. due to new information being available)
- The circumstances under which the expert judgement could be considered as false are understood, documented, communicated and monitored.

However, the effective delivery of expert judgement poses significant challenges for the CRO, particularly in relation to some of the more complex and material application of areas such as determination of correlation matrices, non-availability of historical data or significant recent changes in the structure of the portfolio.

Key Challenges
Inherent subjectivity: At its core, expert judgement is simply an opinion. It is possible to find a wide range of opinions within an organisation as to the way this should be completed. This presents the CRO with the challenge of having to validate that the opinion used in the Internal Model is the correct opinion.

Availability of appropriate independent resource: Typically within an organisation the individuals who apply expert judgement in the Internal Model are also best to understand the exposure/risk that expert judgement is being used to overcome the data deficiency. Therefore, in the majority of small to medium sized insurance and reinsurance companies, the CRO is faced with the challenge of identifying suitably skilled and experienced independent resource for the validation of the expert judgement in the more complex and material areas of the Internal Model.

Solutions
To achieve an effective solution to the challenges posed by validation of expert judgement, the firm should consider the following:

Comprehensive policies: It is critical that the approach to validation of expert judgement is clearly articulated in the data policy and validation policy (or expert judgement policy). These policies should outline, in sufficient detail, the responsibilities of the initiator as well as the validator and should make reference to other governance matters such as approval, escalation and communication. If this basic framework is put in place during the development of the Internal Model, the task of validating expert judgement can be reduced to checking that the stipulated governance process has been followed.

Segregation of duties: Firms can maximise internal resource by clearly defining segregation of duties within the actuarial function and identifying suitably skilled individuals in other areas of the business, such as underwriting or potentially finance. The limitations of this peer review need to be clearly articulated in the expert judgement policy and the mitigation of any risk defined.

Effective use of independent external resource: The lack of internal independent expert resource can be mitigated by engaging external third-party experts to undertake the validation of expert judgement in the complex areas of its use within the Internal Model. The scope of external resources can be focused on specific areas to minimise the cost impact. It should be stressed that the firm will always remain responsible for the conclusions drawn from the validation done by external resource.

CRO Spotlight
It is important to ensure that the data policy (or expert judgement policy) contains a well-defined and documented process for determining the materiality of assumptions in which expert judgement is used. This will enable a proportionate approach to be applied to the validation. Early engagement is recommended if considering the use of external third-parties to ensure the trusted advisor has the appropriate resource ring-fenced to undertake the validation exercise as and when required by the firm’s Internal Model approval application time-slot.
Model Governance and Documentation

Overview
Solvency II requires insurers and reinsurers to have in place an effective system of governance, which covers many aspects of the business including the Internal Model. The precise nature of the system of governance is left to the individual firms to establish. What firms need to remember is that regulators need to ensure that models operate as intended over an extended period of time. Regulators need to rely on the quality of a firm’s own governance structure to achieve this aim; that it will remain effective in all conditions, including when the firm is under capital strain or a volatile risk environment. The proportionate interpretation of “what good looks like” will remain a challenge: it rarely is perceived as adding any real business value in relation to the implementation costs. This article explores the frequent pitfalls and challenges faced by firms to develop governance around their Internal Models, including the requirement for Internal Model Documentation.

Exhibit 8: Documentation Requirements for Internal Models

<table>
<thead>
<tr>
<th>Documentation</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Summary</strong></td>
<td>• Internal Model documentation should enable an independent, knowledgeable third party to form a second judgement as to the reliability of the model and (in principle) enable the third party to reproduce the model outputs if all the parameters and exposure data were available</td>
</tr>
<tr>
<td></td>
<td>• The documentation shall indicate any circumstances under which the Internal Model does not work effectively</td>
</tr>
<tr>
<td><strong>Top Level Documentation</strong></td>
<td>• This is a high level document describing the overall design and operation of the Internal Model</td>
</tr>
<tr>
<td></td>
<td>• It should describe how the model meets the firms business objectives and stated risk appetite</td>
</tr>
<tr>
<td><strong>Granularity</strong></td>
<td>• Communication should be appropriate for the target audience. This will require executive summaries and simplified documentation suitable for senior management</td>
</tr>
<tr>
<td><strong>Structure</strong></td>
<td>• The top level document may refer to a number of other documents covering specific areas, e.g.</td>
</tr>
<tr>
<td></td>
<td>— Model design history and recent major changes to design</td>
</tr>
<tr>
<td></td>
<td>— Data, calibration, expert judgement and parameters</td>
</tr>
<tr>
<td></td>
<td>— Theory, assumptions and mathematical and empirical basis underlying the Internal Model</td>
</tr>
<tr>
<td></td>
<td>— Software implementation</td>
</tr>
<tr>
<td></td>
<td>— Disaster recovery planning</td>
</tr>
<tr>
<td></td>
<td>— Validation</td>
</tr>
<tr>
<td></td>
<td>— Use test</td>
</tr>
</tbody>
</table>
Key Challenges

1. Hindsight

Many firms believe that the governance and control processes in their organisations are adequate. However there is often the potential for these to work more efficiently, when considering the issues and failures that are reported across the financial services industry. In fact firms are failing to understand the potential consequences of poor governance. Insurers and reinsurers understand financial risks such as natural catastrophes, which they can mitigate through reinsurance treaties, but they fail to understand the cost of poor communication or decision making.

It is only when something has gone wrong that the governance and controls are properly analysed, and the realisation made that controls are missing or that further considerations should have been taken into account in the decision making.

2. Timing

The best model governance frameworks are developed in parallel with the model (calculation kernels) that they are designed to control. In situations where the governance framework design and documentation is left to last it tends to fit around the model; at this stage internal processes are relatively fixed, resulting in workaround solutions to evidence governance over the model. This tends to lead to less efficient solutions.

3. Authorship: Skills and Expertise

Unfortunately, the best people to draft good governance frameworks are often those least inclined to do so. These are the individuals, probably managers, who have experience across a broad range of activities, as well as balancing priorities, managing a broad range of stakeholder expectations and understanding the broader issues that are not usually visible to process managers who work in silos. Similarly these individuals need to be able to immerse themselves in the detail, and at the same time have the ability to stand back and challenge whether it all makes sense to others who will need to use the documentation.

CRO Spotlight

Engage the firm’s best people to design the governance framework and actively involve them in the documentation. With a focus on risk and value, they will drive a product that delivers the needs of different stakeholders, including the board and regulator. Another recommendation is to seek independent opinion before it is too late to change the direction.

Solutions

Pragmatically, skilled internal resource will always be a scarce commodity and firms are unlikely to avoid using contractors. Firms are recommended to resource the project team in a way that contractors or other external resource are involved in both the model build as well as documentation. This will provide an element of insight into the model that will result in better quality documentation.

In terms of the documentation approach, there are many codes and guidance notes that provide insight into what is expected and the same principles will apply to model governance:

- Ensure roles, responsibilities and accountabilities are clear and transparent. Documentation thereof should be clear and simple.
- Define the Internal Model processes, and document them to a level that is necessary to guide a suitably competent individual in their implementation.
- Design practical policies; avoid ambiguities or overcomplicated implementation.
- Check that documentation is relevant to the people who will use it, not audit it. Documentation should remain reasonably up-to-date and be written to the level of detail that will shape decision making.

Finally, to ensure sustainability:

- Identify the value the firm wants to achieve from model governance and documentation; how does the firm wish to use it and what are the important factors that provide comfort to the board?
- Be prepared to invest in new processes and tools; some existing practices may not work for an Internal Model.
Navigating the Path Through Regulatory Approval

Overview
The requirements of the internal model approval process (IMAP) under the Solvency II regime are extensive and, in places, complex. The effort required to produce a robust model approval application should not be underestimated. Many firms have been surprised by the level of preparation and resource needed to meet the requirements.

Key Challenges
The extensive coverage of the IMAP process means that it is not uncommon for firms to have implemented programme-based project management approaches to ensure all the requirements are addressed. This often involves project management teams that are not risk management or insurance specialists managing delivery from resources across the senior management, underwriting, risk management, compliance, internal audit and actuarial teams. Under such structures the requirements of the IMAP process can easily become separated from the real business value that a fully embedded internal model should bring.

Pressure to deliver evidence that progress is being made can turn the process into a ‘box ticking’ exercise that becomes little more than a regulatory burden. This type of approach can disenfranchise key stakeholders in the Internal Model, working directly against the need to embed the model in the business and demonstrate its ongoing use in the decision making process, something that is essential if regulatory approval is to be achieved. The challenge will increase for those firms with operations in different jurisdictions since not all regulators will have the same expertise or the same approach to the IMAP.

Solutions
Solvency II provides an opportunity for firms to fully embed insightful, risk-based information within the day to day operations of the business. While no model will be able to perfectly predict future results, any firm with an internal model that satisfies the IMAP requirements will be well-positioned to understand the potential impact of strategic decisions on return on capital, volatility of financial results and short term profitability.

The IMAP requirements are extensive, however, focusing on implementing an approach that primarily addresses business needs and maximising the commercial value that can be extracted from the process, while simultaneously meeting the IMAP requirements should make approval easier to achieve. For example, involving the relevant end users of model output in the design and execution of the model validation process will increase their understanding of how the model operates, allow them to be more confident in considering model output as an input to the decision making process and will drive pressure for the continual model improvement that is fundamental to meeting the model use requirements.

Many firms’ Solvency II implementation plans run over a number of years. Taking stock on a regular basis to identify areas where progress has been lacking and seeking to align objectives with real business needs can help to reinvigorate the process and ensure that all requirements for regulatory approval are effectively addressed.

CRO Spotlight
Proactively seeking early engagement with the regulator is one of the best ways to ensure there is a good mutual understanding of how the firm is working to meet the IMAP requirements. This provides the opportunity to understand any areas of regulatory concern as early in the process as possible, allowing plenty of time for remedial action to be taken if necessary.
Model Change Policy: Balancing Prudence and Practicality

Overview
The Model Change Policy is part of a suite of key policies that firms need to submit with their application for a full or partial Internal Model. The other policies include the Model Validation Policy and Model Governance Policy, however the Model Change Policy is perceived by many CROs to be the most complex and contentious of all.

The model change policy has proved challenging for firms that have already significantly progressed in their Solvency II programmes. Many of these challenges can be avoided or minimised through careful planning, allocation of time, budget and resource reflective of the importance and complexity of these policies.

Key Challenges
The key challenges that firms face with the Model Change Policy fit broadly into three areas:

Timing and Resource Allocation
The structure, timing and resource allocation for Solvency II programmes can have a significant impact on the quality and appropriateness of the model change policy.

• Resources: To produce an appropriate Model Change Policy requires a mix of skills and expertise that is frequently underestimated. These skills include:
  — An understanding of the internal model
  — A broad understanding of the business and internal model operations
  — A robust understanding of regulatory requirements and the ability to apply them proportionately
  — Strong influencing and written communication skills.

• Timing: The Model Change Policy is typically produced following the completion of the design and build of the calculation kernel. The effect of this timing is that operational challenges posed by the management of model change are not taken into account in the structure of the calculation kernel.

Model Scope and Business Operations
A firm cannot produce an effective Model Change Policy unless it fully understands the scope and operation of the Internal Model, including all components, risk coverage and legal entities included in the Internal Model. Ideally this should be described in a schematic, supported by a more detailed written document. There are several operational considerations that need to be taken into account.

• Model documentation: Internal Model scope documentation is frequently too theoretical, with limited linkage to the actual processes and business operations that sit behind it. Firms need to fully understand how a change in the business will, or should, result in a change in the internal model or the impact of these changes on the governance of the model.

• Definition of model changes: Defining what constitutes a change in an Internal Model is critical to the effectiveness of the Model Change Policy. However this is an area that generates extensive debate, particularly in defining ‘business-as-usual’ operation of the model versus ‘change’ that would be governed under the Model Change Policy. For example, a strategic decision to launch an existing product into a new territory through an existing legal entity has the potential to change key assumptions and methodologies in the model because the new territory may have significantly different risk characteristics.

• Identification of change: Many changes to the Internal Model will be identified by the analysis performed by the actuarial and risk management function; however firms also need processes for the identification of other changes that originate from business operations and strategic decisions. The risk management function should be engaged in the business so that identification of model change requirements is seamless and timely.

• Materiality: Understanding and defining materiality for the firm is undoubtedly the most difficult aspect of the policy: what constitutes a major change versus a minor change? Firms need to define quantitative metrics (e.g. percentage changes in their SCR) as well as qualitative factors (e.g. weakening of the governance framework). Materiality criteria should take into account the factors that drive strategic decision making and risk appetite.
Potential Conflict Arising From Proportionality

While the Solvency II directive is principles-based, it is already evident that regulators have a different expectation to firms as to what constitutes a change and the materiality of that change. Regulators are motivated by the need to ensure that Internal Models remain appropriate for the calculation of the SCR, whereas firms need to ensure that the processes surrounding internal model usage are sustainable and affordable. This has potentially significant consequences for firms in terms of the resource required and the potential capital implications while approval for major changes is sought from the regulator. Firms will need a contingency plan in these circumstances which should include use of the Standard Formula for a least part of the SCR calculation.

Solutions

Firms are advised to be proactive in the development of Model Change Policies, by performing the analysis to support materiality criteria and provision of rationale to support policy statements. Regulators are likely to listen to reasonable arguments if this demonstrates how the policy provides a strong environment to ensure that internal models remain appropriate for the ongoing measurement of risk profile.

CRO Spotlight

It is often what is not in the document that is more important and likely to cause a problem. Firms are encouraged to facilitate discussions with a small group of key stakeholders to agree the key policy points and obtain buy-in for the interpretation of proportionality. It is also advisable that the facilitation of these discussions is from skilled and experienced individuals who are impartial and objective in their guidance and can challenge the initial findings of these discussions.
Internal Models: Avoiding the Pitfalls in Development

Overview
A fully embedded Internal Model is an important element of an effective risk management system. However, experience shows that the cost and time spent on internal model implementation, maintenance and governance can vary substantially from company to company.

The development of an Internal Model can present a significant challenge for an insurance company. This article explores the key factors for a seamless set-up and operation of an Internal Model and the way in which companies avoid bad surprises and never ending projects. The recommendations are based on Aon’s experiences supporting companies through various stages of their Internal Model implementation projects.

Key Challenges
Collaboration: The holistic approach to understanding exposures and quantifying risk under Solvency II requires cross-functional thinking and the buy-in of a range of departments. It is likely that these departments are not used to collaborating to the extent necessary to develop and implement an effective internal model.

Cost effectiveness: As with any sizeable cross-functional implementation project, insurance companies will have to find an efficient project management approach by carefully considering internal and external costs for the set-up and running of the model.

Solutions
Internal Models are, by nature, insurer-specific so solutions for the challenges mentioned above must be tailored accordingly. However general suggestions include:

1. Appreciation of the Holistic Approach
   It is advisable to achieve the buy-in of all departments involved as early as possible. These departments will not just be reduced to the role of data providers but will play a vital role in the use and governance of the model. For example, they will need to highlight the changes in the business environment and business conduct which will require model changes. The examples go far beyond the obvious ones, such as changes in risk mitigation communicated by the reinsurance department or changes in the legal environment.

2. Thorough Budgeting, Scope Definition and Model Design
   A well thought-out scope definition and appropriately designed model architecture are the most important drivers for the success of any Internal Model. In many cases, the combined use of internal and external resources is the most efficient way to find company-specific answers to the following set of questions:
   - What should be captured by the Internal Model to reflect the nature and complexity of the company?
   - Which elements from a cost-benefit analysis are better dealt with by the Standard Formula?
   - What is the best way to aggregate the contributions of single risk drivers?
   - How can the principle of proportionality be applied with greatest benefit?
   - What are good cost estimates for different options?

3. Focus on Core Competence
   In view of the challenges involved in developing an Internal Model and the often limited availability of in-house resources, it is very important for companies to carefully define the areas in which there is significant in-house expertise. In particular, the “make or buy” decision is very important when considering the choice of the actuarial modelling tool. Third-party tools with a long-standing track record and a large user base bring a number of benefits. These benefits include assurance that errors are discovered and fixed in a timely manner, as well as credibility with supervisory authorities. In addition, they are usually more cost effective and easier to manage than an in-house developed tool created with spreadsheets, macros or general statistical standard packages.
In fact, the critical path of Internal Model implementation projects was, often unexpectedly, determined by the development time for these in-house tools. Setting up an Internal Model is an iterative process and intermediate results of, for instance SCR calculations, are a key instrument to trace errors. Therefore, the company needs to be able to reliably calculate these values early in the process. This can be difficult to achieve in a timely manner when developing an internal bespoke modelling solution.

Finally, an effective use of external expertise has benefits in other areas. A firm may decide that the development of the various policies needing supervisory approval is best accomplished by leveraging external knowledge, while their maintenance can be delivered by internal resources. Similarly, the first-time validation of the model may benefit from the involvement of external parties, while ongoing regular validation exercises are delivered by internal resources.
Overview
Insurance companies have spent recent years scrambling to prepare their Internal Models for the internal model approval process (IMAP). The recent delay in Solvency II has provided some breathing space to take stock and evaluate the work so far. There is now a great deal of experience of building capital models in the market and now is a good time for companies to consider lessons learned. Indeed most UK companies have been through two iterations of the Internal Model within the Individual Capital Adequacy Standards regime before the IMAP process.

Key Challenges
One key challenge for firms is that models have grown enormously in terms of scale and complexity. Much of that has been inevitable based on demands from regulators and stakeholders, but the costs of complexity have only recently been fully appreciated. Simpler models are highly desirable, but how to achieve this?

Solutions
There are several approaches which companies can take. One approach is to assess the required outputs for management and stakeholders, and then in the light of these outputs review all the inputs with a view to simplifying wherever possible. For example, modelling all prior underwriting years separately may not be essential, and it may be possible to aggregate a number of these. It may be possible to aggregate a number of lines of business, if they are sufficiently small. Would any one of these lines produce losses sufficiently large to materially impact the company?

CRO Spotlight
Model complexity has grown enormously in recent years. Companies are realising that they may need a number of variants of models to answer different financial questions, plus that they need the right software with the flexibility to respond to the various modelling questions facing firms today.

One reason for the complexity is the idea of having one master model for the company that answers any question required. The resulting model is inevitably a monster! Companies are realising that they may need a number of different models to answer different questions. The result is a process rather than a single model. Given this, companies need to have software such as ReMetrica, which is both flexible and does not require programming. In addition, the software has been developing apace. ReMetrica version 6.0 includes a new technology called super components that simplifies models and reduces model size by up to 95%.

Another aspect which has become increasingly apparent is the need for good process control throughout the project. This hasn’t always been a natural instinct for modellers and actuaries, but model development is very similar to software development. Just as in software development, the process of requirements, design, model implementation and testing with a governance process using version control and audit trails is the future for capital modelling.
Pillar 2
The ORSA: Navigating the Business Through Risk and Capital

Overview
A key challenge for firms under Solvency II is the performance of an Own Risk and Solvency Assessment (ORSA), yet the final timeline for Solvency II implementation is still uncertain. In the absence of detailed regulatory guidance, firms are required to define an ORSA that is appropriate to the nature, scale and complexity of their own organisation. The question on many minds is what this should look like and how it shall be performed.

The ORSA is fundamentally about the assessment of the solvency needs for a firm taking into account the business strategy, risk appetite and the external environment — in addition to the impact that this may have on the firm’s risk profile in the near to medium term. This assessment may be a greater challenge for firms using the Standard Formula due to the lack of availability of quantitative measurement tools and the level of preparation. While such firms have been engaging in Quantitative Impact Studies (QIS), few have started building new processes or tools to perform the ORSA.

This article explores the differences between Internal Model and Standard Formula users, plus the impact on organisational nature, scale and complexity when undertaking the ORSA.

Key Challenges

1. Analytics
   The key components of the ORSA are the same whether a firm uses an Internal Model or the Standard Formula but the way in which the analytics is done may be different. Internal Models are sophisticated tools for the quantitative measurement of a firm’s unique risk profile; in contrast the Standard Formula is a factor-driven approach that calculates the capital requirement for a ‘typical’ firm in the market. As such, the Standard Formula is not necessarily the best tool for the ORSA unless it is recalibrated and complemented with further analysis to capture the companies risk profile.

   Standard Formula firms with the greatest challenge are those that have complex risk profiles; these firms will find it difficult to demonstrate that a non-quantitative approach or simple analytics has sufficient sophistication to achieve the objectives of the ORSA. It is the complexity of the risk profile and the market in which it operates that defines proportionality. Small firms with complex risks will require a more quantitative approach to the ORSA; firms with simple, stable risk profiles will require less sophisticated analytical tools.

   On the other hand, the primary focus of the ORSA is the conclusions drawn from the critical assessment of the risk profile and solvency needs in the context of the firms’ strategy and risk appetite. The focus is not merely about the tools that are used.

2. Other Components of the ORSA
   While the analytics is the primary area for variability in approaches, there are other components in the ORSA that require a proportionate interpretation:

   **Business strategy and risk appetite:** These are required to be covered by all firms; smaller less complex firms will have a simpler assessment of the impact of their strategy and risk appetite on the firms risk profile than more complex organisations.

   **Risk profile:** The articulation of the risk profile is the core of the ORSA for all firms. Larger firms with more resources may need tools to facilitate the identification and transparent communication of their risk profile to key stakeholders, whereas smaller board-led organisations may perform perfectly adequate and robust risk assessments which are captured on spreadsheets. It is the quality of the identification and assessment that is important, not the sophistication of the recording process.

CRO Spotlight
The ORSA provides a robust framework for achieving “good” risk management. Where firms have a strong grip on their risk profile, the CRO should not be afraid of producing an ORSA that demonstrates an integrated and forward-looking assessment of their risk profile under current and stressed conditions, while looking significantly different to their peers. It is not what it looks like — but the quality of the thought processes that it produces and concludes upon.
**Solvency projection:** This is the area of greatest challenge for standard formula users. The projection will require some quantitative analytics, ranging from effective use of Excel tools to more complicated stochastic models. The directive indicates that qualitative assessments may be used on non-quantitative risks; however, firms still need to articulate the relative scale of the risk as well as the qualitative triggers that identify when risks are exceeding appetite and availability of capital.

**Stress testing:** Stress tests are an effective mechanism to qualitatively and quantitatively test the effect on the capital and solvency of adverse changes in financial conditions. Stress tests need to be performed by all firms, however, the balance of quantitative and qualitative analysis will vary in line with the nature and complexity of the organisation. Where qualitative methods are used, the output stills needs to demonstrate a careful consideration of direct and indirect effects and relative scale of impact.

**Solutions**

**Exhibit 9: The ORSA Framework**

<table>
<thead>
<tr>
<th>Risk Governance</th>
<th>Risk Identification</th>
<th>Risk Measurement</th>
<th>Risk Mitigation</th>
</tr>
</thead>
</table>
| • Strategy and policy  
• Risk appetite and tolerance  
• Governance and organisation  
• Validation  
• Internal control / assurance | • Tools and methodologies  
• Classification and ranking  
• Record keeping | • Risk metrics  
• Performance measurement  
• Aggregation  
• Extreme event management | • Insurance and hedging strategies  
• Capital optimisation  
• Reinsurance optimisation  
• Control improvement programmes |

**Own Risk and Solvency Assessment (ORSA)**

“bringing it all together”

**Enablers**

- **Risk behaviour**
  - Communication
  - Managing change
  - Organisational learning
  - Skills and resource
  - Incentivisation

- **Processes, data and systems**
  - Data quality
  - Systems
  - Processes

Internal Models are a powerful analytical tool for insurers that want to gain insight into their risk profile in order to optimise the risk inherent in their pricing strategies and balance sheet. Firms should consider developing models regardless of whether they intend to apply for regulatory approval in the short term. Models can be developed proportionately to meet the required level of sophistication and are an invaluable tool in the performance of an ORSA. Firms are recommended to consider the benefits to their business of an Internal Model, and where appropriate, to build one to suit their own needs and timeframes.
The ORSA: Beyond Regulation

Overview
Lloyd’s firms have already submitted their first ORSA. Other Internal Model firms that are part of EU regulators’ “internal model pre-application process” will also be required to demonstrate how their ORSA will work and will undoubtedly receive feedback as part of the self assessment and review process.

Many firms that have been involved in these early reviews have become significantly frustrated and disheartened as a result of making their ORSAs “conform” to a regulatory expectation or norm. CROs are more frequently referring to the ORSA as a regulatory document instead of a risk management tool. This poses a significant risk to the achievement of the Solvency II principles if there is a move to fill a regulatory tick-box instead of being a process by which an “undertaking engages in the process of assessing all the risks inherent in its business and determining its corresponding capital needs”.

Key Challenges

• Regulatory Guidance
There are no explicit guidelines on what the ORSA should look like: EIOPA has explicitly stated that they will not produce any further detailed guidance, as this is contrary to the principle that the ORSA is owned by the firm. In the recent EIOPA report on the ORSA consultation it is stated “undertakings are expected to have the necessary competence and expertise to find fit-for-purpose solutions for the practical challenges they face.”

Furthermore the review process that Internal Model companies are experiencing is forcing ORSAs to be a lot more consistent than maybe EIOPA intends. As regulators see one good example, they expect similar good practice to be visible in other ORSAs and this has the tendency for regulators to impose a standard on firms through the feedback they receive.

• Regulatory Review: Insight and Interpretation
An effective ORSA requires companies to break down processes and decisions in silos in a way that has not typically been achieved in the past. A significant proportion of organisations have “adequate” processes in place to identify the key risks and separate functions have processes in place for setting strategy and performing stress and scenario and capital calculations or projections. Where organisations fall short of regulatory expectations is that they fail to adequately assess the impact or outcome of one process on another or to reach any meaningful conclusions from the output of these separate functions and processes.

Unfortunately senior management is unlikely to improve this situation unless they fully understand the limitations or lack of connectivity between these separate processes.

The gaps in the ORSA become more noticeable when feedback is received from the firm’s regulator for mitigation. Where firms perceive that significant effort has been invested into building the ORSA, the feedback received from regulators can be frustrating. Furthermore, there are significant time constraints to meet regulatory deadlines, which cause firms to focus on filling the content gaps without addressing the objectives behind the feedback. In these situations firms may start to treat the ORSA as a regulatory rather than a business document.

Solutions
These challenges can be avoided by taking the following points into account:

• ORSA design: Ensure a deep understanding of the principles of the ORSA; what is it trying to achieve? Be brave and design the ORSA processes with these principles in mind. Be careful to express explicitly why these processes are appropriate for the business.

• Accountability and influence: The ORSA needs to be driven by a highly skilled, influential employee that has a broad understanding of the business. Accountability is key as the development of the ORSA will require senior stakeholders to change what they currently do.

CRO Spotlight
Firms that simply combine existing management information together to form the ORSA will derive no business benefit — and the ORSA will become an expensive regulatory burden that disengages the key stakeholders that it seeks to unite.

The value of the ORSA is that it encourages a holistic consideration of risk. By seeking to deliver a business-orientated ORSA firms will challenge internal preconceptions about the value of risk management.
Survival Skills for Senior Management in a Solvency II World

Overview
Solvency II seeks to enhance a firm’s system of governance and redefine what is required in terms of the roles and responsibilities of the ‘administrative, management or supervisory body’ of the insurance company. It is a significant change from the approach under Solvency I and existing local regulations such as the UK’s Individual Capital Adequacy Standards, which were more focused on the quantitative aspects of capital adequacy.

The Pillar II requirements emphasise that the board is ultimately responsible for Solvency II and regulators will be looking for evidence of how senior management takes risk into account in the running of the organisation. The board will need to understand the firm’s exposure to risk against risk appetite and ensure appropriate systems and functions are in place for managing risk. Senior management will also have to account for the constituents and assumptions in the Internal Model, demonstrate use of the model in decision making and justify their own forward looking assessment of solvency.

Overall, the nature, frequency and depth of engagement of the board on risk management will need to change under Solvency II. This may require a significant cultural adjustment particularly where risk management has been viewed as a compliance exercise rather than a value-adding activity and senior management has not had to demonstrate the link between key decisions with the analysis of the risks associated those decisions.

Key Challenges
A key challenge for the CRO will be managing change upwards. Obstacles may include:

- The weak technical capabilities of the board and in particular non-executive directors to understand and challenge the actuarial aspects of risk and capital management and the output of the internal model
- The lack of engagement between the board and the risk function especially if the risk management function is not represented on the board
- The poor level of risk management sophistication in the organisation and the degree to which risk management is embedded in the culture of the organisation beginning with the ‘tone at the top’
- The deficiency of management information (MI) that enables senior management to use risk information in key decisions.

CRO Spotlight
The risk culture of the insurer is being put under the spotlight with Solvency II. The Pillar II requirements are addressing fundamental attitudes towards risk management. An important role for the CRO will be to help senior management understand their own attitudes towards managing risk and to educate them on the value effective risk management can add to the organisation so that the regime is not seen as another regulatory tick-boxing exercise.

Solutions
Irrespective of how advanced firms are in the quantitative aspects of Solvency II, CROs are advised to start engaging with senior management on the challenges described above and perform a training needs analysis. This could be in the form of an online questionnaire for board members and non-executive directors to complete on specific aspects of Solvency II or on the perceived risk maturity of the organisation in order to assess attitudes toward risk management.

Essential training workshops are likely to cover the ORSA, risk appetite and maximising the use of risk data to support key decisions (‘Use Test’). Training on technical aspects such as scenario testing, stochastic modelling and key model assumptions will enable senior management can understand and challenge the output of their capital models. MI may have to be redesigned to reflect the new levels of board understanding and ensure it is used in the strategic decision making process.
Risk Appetite: Practical Steps for Smaller Firms

Overview
Risk appetite is a fundamental component of business culture that is core to the successful management of insurers and reinsurers. The term risk appetite encompasses (i) the quantitative and qualitative measurement of risk, (ii) the setting of limits and budgets around chosen risk measures, and (iii) the allocation of risk budget and limits across sources of return in the business.

Key Challenges
The measurement of risk is often perceived to be intertwined with the concept of an Internal Model. That is, risk should be quantified using tail measures such as Value at Risk (VaR) or Tail Value at Risk (TVaR). However, these are difficult to measure, since they can only be well quantified using a stochastic model of the balance sheet that simulates the potential profits and losses arising from different areas of the business, incorporating the correlation and tail dependency between risk types.

For smaller firms, the construction of an Internal Model often is not a practical option, due to the development costs and ongoing resourcing required. Therefore it is necessary to consider what alternative approaches exist and whether there are limitations in viewing risk appetite outside the lens of the Internal Model. To answer this question, it is instructive to first observe some properties of a risk measure based on tail behaviour:

- While VaR 99.5% is the prescribed risk measure for quantifying the level of capital required under Solvency II, this does not necessary imply that it is an appropriate choice of risk measure from the perspective of practical implementation of risk appetite.
- The level of confidence in the estimate of VaR 99.5% is relatively weak from a statistical perspective – very limited data exists to parameterise the 1 in 200 year return period.

Therefore, from the viewpoint of utilising risk appetite to set business strategy, it is not necessarily sensible to consider the probabilistic aggregate risk tail behaviour which cannot be reliably quantified.

CRO Spotlight
Risk appetite is a topic often confused with capital management. While an AA rated firm’s required capital may be assessed at about the 1 in 3000 year percentile, this cannot actually be quantified in a statistically meaningful manner. It is therefore important to understand how the board and investors view risk and incorporate this into the measure of risk used to drive business strategy. Smaller firms should focus on tractable risk measures and be aware that Internal Models are not a pre-requisite for embedding risk appetite into business processes.

Solutions
Our recommendation to smaller firms considering their view of risk appetite is to focus on tractable risk measures that can be well quantified and hence can be used to reliably inform business decisions with a high degree of credibility. Tail risks should also be incorporated, but with less complexity than is necessary in a full Internal Model through techniques such as scenario analysis, stress testing and exposure management.

One sensible approach for Standard Formula based firms is to look at alternative measures of risk that are easily quantified and aggregated such as standard deviation or volatility, which should be estimated with statistical confidence for each balance sheet risk group. The overall standard deviation of the insurer’s surplus can be estimated without making any distributional assumptions as long as the firm understand the correlations between different risk groups. In this way, a simple factor model can be constructed that accurately quantifies the firm’s overall balance sheet volatility and facilitates risk informed decision making such as setting and monitoring of risk appetite limits and tolerances.
Embedding Risk Appetite

Overview
Having articulated the firm’s risk appetite, the next stage is to integrate this view of risk into key business processes across the enterprise. This should encompass all areas of the business in which risk management decisions are to be made and, in particular, all profit generating areas of the business where risk and reward should be carefully balanced such as the setting of underwriting, investment and reinsurance strategy. Firms that successfully embed risk appetite into their core business processes can benefit from superior risk-adjusted profitability and greater predictability of their financial results.

Key Challenges
Embedding risk appetite into key business processes requires a change in mindset from focusing on volume driven measures of success to a risk-adjusted view of profitability. This change in business ethos presents a number of challenges to the management:

• How to transform the underwriting strategy from a volume-driven model to one based on maximising risk-adjusted profitability?
• How to incorporate information regarding risk budgeting and consumption into the underwriting strategy without alienating underwriters by using new capacity measures?
• How the overall risk budget should be allocated between different business units and risks to maximise enterprise value?

Solutions
Transforming the business to optimise risk-adjusted profitability requires a firm to embed the chosen risk measure into core strategic processes for setting business strategy. Some key considerations when embedding risk appetite include:

• Holistic risk allocation between insurance risk and investment risk. Many insurers have historically managed insurance risk and investment risk as silos and often using inconsistent risk measures. Implementing a consistent risk measurement framework for the enterprise enables risk budgets to be properly allocated across the balance sheet. The advantage of this approach is that the underwriting and investment functions can individually optimise their strategy within a risk budget that aggregates consistently to the overall risk appetite of the firm.

• Granular assessment of underwriting strategy and investment strategy within the risk budget allocated at the enterprise level. This is a crucial aspect of embedding risk appetite which requires the most effort from a transformational perspective. An important consideration for underwriting strategy is whether risk budgeting should be performed bottom up or top down. For example, under a bottom up risk budgeting approach, each underwriting team is set a risk capacity that works alongside their premium capacity. Whereas under a top-down approach, the chief underwriting officer determines the optimal allocation of premium across different business lines and underwriters can continue to work under a simpler capacity driven constraint.

Risk appetite can be embedded at many levels of sophistication in a firm and the principles are equally valid for all sizes of insurer. The true value of running a business within the philosophy of optimising risk-adjusted profitability is the attainment of strong levels of profitability that are sufficiently predictable and for which volatility is in line with the management’s expectations.
Pillar 3
Meeting the Data Quality and Governance Challenge

Overview
Solvency II contains several data quality and data governance requirements spread over a variety of its articles. These disparate requirements do not fall conveniently to a well-defined single owner within the business, presenting a major challenge for the CRO to ensure that the Directive’s Statistical Quality Standards Test is passed by the organisation.

Key Challenges
The majority of Internal Model insurers and reinsurers have now developed their data policy but the majority of companies are struggling with the practical implementation of the data management processes and data governance procedures that are prescribed within it. The key challenges that organisations are facing in effective implementation are:

- Identifying individuals who are appropriately skilled and who have the time (or who will make the time) to undertake data governance roles
- Installing appropriate data quality metrics to enable measurement of the effectiveness of the data governance through improvements and deteriorations in the level of data quality
- Not having full ownership and control of the disparate sources of data used in the Internal Model
- Inadequate IT systems for the storage and validation of the accuracy of data used in the Internal Model
- The widespread use of spreadsheets and other uncontrolled formats of storing or manipulating data which feed into the Internal Model

There is also a real risk that companies manage to pass the initial Statistical Quality Standards test but, due to an ineffective data governance framework, the data quality of the Internal Model may deteriorate over time. This could lead to the approval to use the Internal Model being rescinded and the company having to revert to using the Standard Formula or suffer regulator imposed capital add-ons.

CRO Spotlight
For data governance to be effective and add value to an organisation it is key that board and senior management directly appoint appropriately skilled individuals in the data governance framework. These people should have sufficient motivation to ensure that the Internal Model’s data quality improves over time and are truly empowered to make decisions to rectify the material data quality issues that are identified by the business. Data quality through adequate data warehousing systems will be a core differentiator for insurers and reinsurers in the future.

Solutions
It is key that the CRO ensures that there is board and senior management level buy-in to the data quality and data governance programmes, plus that the correct individuals within the business are allocated with its implementation and operation. Historically, it has proved challenging to effectively achieve board and senior management engagement as the benefits of these projects are often intangible—while the costs of the effort are decidedly visible and real.

It is also a fundamental requirement that the data policy, which is the foundation of the data governance framework, is fit for purpose and defines an appropriate data governance framework that will tackle data quality issues in a proportionate manner. As such this will not leave the business with either ineffective data quality controls and procedures or a dead weight of effort being applied to issues that are ultimately not material to the functioning of the Internal Model. The data policy should also define appropriate metrics by which the board can monitor the progress of the data quality efforts visible and thereby assist in providing the continued senior level sponsorship required.
Optimal Group Structure Under Solvency II

Overview
Many insurance groups have been built up through acquisitions, creating multiple underwriting platforms with separately regulated local subsidiaries. Under Solvency II, the capital from all the various subsidiaries is added together and the cumulative sum tends to be much higher than it would be if it a single consolidated entity. The consequences of these complex structures are discussed in this article.

Exhibit 10: Typical Current Group Structure

Key Challenges
Looking at Exhibit 10, a number of challenges for groups emerge and can be clustered into the following key themes:

1. Cost Effectiveness: Reporting, Compliance and Supervision
   The costs of meeting group supervision and reporting requirements are expected to be significant. Under Solvency II, a group will be supervised by a lead regulator in addition to local supervision of subsidiaries in other territories. The lead regulator will be identified by the territory of the group head office or holding company, regardless of whether that entity is an insurance company or not. The group regulation is based on two principles:
   - Each subsidiary must meet its local requirements
   - The group must meet the Solvency requirements of the country where the parent company is located
   The more separate legal entities in the group the greater the challenge will be in terms of managing their reporting and compliance requirements.

2. Capital
   Colleges of supervisors have been established to define how lead regulators engage with regulators of subsidiaries in other territories and this will increase the complexity of reporting.

   The capital consequences for groups under Solvency II are material, particularly for global groups, with subsidiaries in non-equivalent territories.

   Solvency II stipulates that groups need to calculate their Own Funds. The mechanics for the calculating these will differ according to whether an Internal Model or Standard Formula is used. The default method for aggregation of solo entity SCRs is the accounting consolidation-based method, however member states may allow the group supervisor to apply the deduction and aggregation method where the former is not appropriate. A combination of the two methods is also possible. The methods have limitations in the amount of diversification that can be recognised across separate legal entities, which will result in a higher aggregated SCR than if all risk resided in a single legal entity.
Solutions
Groups are being forced to consider simplified operational and legal structures in order to gain maximum diversification and capital fungibility benefits. Restructuring activity is underway in the industry for several reasons:

- Firms may exit those business lines deemed too capital intensive and therefore uneconomic. Firms are beginning to focus on core business, generating the need for conclusion of discontinued operations.

- Improved cost and capital efficiency of their operational structures, including group reporting and supervision.
  
  — Firms that intend to use an Internal Model may find that moving to a single entity structure will make the task of securing I model approval much easier as the firm would only prepare one application rather than a separate one for each subsidiary.

  — The amount of data gathering and regulatory reporting in a single entity is likely to be lower than a group with multiple subsidiaries.

  — Solvency II allows groups to report as a single entity. Firms can apply to the group supervisor to submit both an ORSA (Own Risk Solvency Assessment) and a SFCR (Solvency and Financial Condition Report) for the whole group. Both reports must have sufficient detail of each individual solo entity in the group and they will be shared with all relevant supervisors.

- Firms operating through a single underwriting platform will benefit from full diversification of different lines of business and different geographical underwriting activities. From a capital perspective, a group operating through one subsidiary can have a significant capital saving over a group of comparable size operating through many subsidiaries.

CRO Spotlight
Groups are being forced to consider simplified operational and legal structures in order to gain maximum diversification and capital fungibility benefits. Understanding the benefit of an optimal group structure can help to significantly reduce the compliance requirement and the Solvency Capital Requirement for the group.
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