



**THE SOCIETY OF ACTUARIES IN IRELAND**

**How to go about the Life ORSA –  
Some practical considerations on the technical aspects of  
completing an initial ORSA for a life company**

**Report of the Life ORSA Working Party**

**April 2012**

*This is a discussion paper produced by a Working Party of the Society of Actuaries in Ireland. The purpose of the paper is to provoke and contribute to an informed debate that will enhance the profession's consideration of the Solvency II ORSA in professional practice. It is intended to stand on its own and be freely interpreted. As such, it is not guidance. Ultimately, it is the Society's Code of Professional Conduct and Actuarial Standards of Practice, together with statutory and regulatory requirements that govern the professional responsibilities of actuaries. The Working Party believes that expanded discussion of the concepts and suggestions offered in this paper will benefit the profession and will assist actuaries in applying the Code and Standards to their individual situations.*

# ORSA and the Directive

Article 45 of the Solvency II directive sets out the requirement for the ORSA

## *Article 45 Own risk and solvency assessment*

1. As part of its risk-management system every insurance undertaking and reinsurance undertaking shall conduct its own risk and solvency assessment.

That assessment shall include at least the following:

(a) the overall solvency needs taking into account the specific risk profile, approved risk tolerance limits and the business strategy of the undertaking;

(b) the compliance, on a continuous basis, with the capital requirements, as laid down in Chapter VI, Sections 4 and 5 and with the requirements regarding technical provisions, as laid down in Chapter VI, Section 2<sup>1</sup>;

(c) the significance with which the risk profile of the undertaking concerned deviates from the assumptions underlying the Solvency Capital Requirement as laid down in Article 101(3)<sup>2</sup>, calculated with the standard formula in accordance with Chapter VI, Section 4<sup>3</sup>, Subsection 2 or with its partial or full internal model in accordance with Chapter VI, Section 4, Subsection 3.

2. For the purposes of paragraph 1(a), the undertaking concerned shall have in place processes which are proportionate to the nature, scale and complexity of the risks inherent in its business and which enable it to properly identify and assess the risks it faces in the short and long term and to which it is or could be exposed. The undertaking shall demonstrate the methods used in that assessment.

3. In the case referred to in paragraph 1(c), when an internal model is used, the assessment shall be performed together with the recalibration that transforms the internal risk numbers into the Solvency Capital Requirement risk measure and calibration.

4. The own-risk and solvency assessment shall be an integral part of the business strategy and shall be taken into account on an ongoing basis in the strategic decisions of the undertaking.

5. Insurance and reinsurance undertakings shall perform the assessment referred to in paragraph 1 regularly and without any delay following any significant change in their risk profile.

6. The insurance and reinsurance undertakings shall inform the supervisory authorities of the results of each own-risk and solvency assessment as part of the information reported under Article 35<sup>4</sup>.

7. The own-risk and solvency assessment shall not serve to calculate a capital requirement. The Solvency Capital Requirement shall be adjusted only in accordance with Articles 37, 231 to 233 and 238<sup>5</sup>.

<sup>1</sup> Rules relating to technical provisions

<sup>2</sup> Calculation of the Solvency Capital Requirement ( "it shall cover existing business as well as the new business expected")

<sup>3</sup> Solvency capital requirement

<sup>4</sup> Information to be provided for supervisory purposes

<sup>5</sup> Article 37 Capital add-on; Article 231 Group internal model; Article 232 Group capital add-on; Article 233 Method 2 (Alternative method): Deduction and aggregation method; Article 238 Subsidiaries of an insurance or reinsurance undertaking: determination of the Solvency Capital Requirement

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# 1 Introduction

The introduction to the Solvency II Directive states that “all insurance and reinsurance undertakings should have, as an integrated part of their business strategy, a regular practice of assessing their overall solvency needs with a view to their specific risk profile (own-risk and solvency assessment). That assessment neither requires the development of an internal model nor serves to calculate a capital requirement different from the Solvency Capital Requirement or the Minimum Capital Requirement”.

The requirement for the Own Risk and Solvency Assessment (ORSA) is set out in Article 45 of the directive and elaborated upon in the proposed EIOPA guidelines<sup>6</sup> (“the Guidelines”). Outside of this, however, there is no further formal information on the ORSA and how it is expected to look. Most of the ORSA material is quite generic and principles based. This lack of prescription is deliberate, to ensure that companies take responsibility and design their **Own** Risk and Solvency Assessment – or as one recent presenter commented “it’s better that there is not too much guidance as risk management is not the same as compliance”.

Notwithstanding this, however, the aim of this paper is to provide some suggested approaches for life companies to help them along the journey of their ORSA development. The remainder of this report is structured as follows:

- Section 3 considers the main groups that will be involved in the production and use of an ORSA;
- Section 4 addresses some of the key areas of documentation relating to the ORSA, which can serve as a helpful starting point for companies considering how to approach the ORSA;
- Section 5 discusses the concept of economic capital and how it applies within the ORSA, including its relationship to the capital requirements of a standard formula SCR;
- Section 6 covers the relationship between economic capital and a company’s risk appetite, and how these two areas should interact within the ORSA;
- Section 7 explains various approaches to performing the capital projections required for the ORSA;
- Section 8 provides some thoughts on the range of stress tests and scenarios that companies may wish to include within their ORSA work;
- Section 9 addresses the requirements for continuous monitoring of the solvency position; and
- Section 10 summarises the key messages that the working party believes companies should consider when approaching the ORSA.

Each section of this paper aims to answer some significant questions in the practical preparation of an ORSA for a life company. In doing this, the first 15 EIOPA Guidelines have been taken into consideration. The remaining Guidelines (16 to 24) concern Group Specificities of the ORSA and were considered out of the scope of this paper. The key questions and the Guidelines referred to are noted at the start of each section.

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<sup>6</sup> EIOPA-CP-11/008 - Consultation Paper On the Proposal for Guidelines on Own Risk and Solvency Assessment, published 7 November 2011.

This paper reflects the discussions of the working party on the various topics. We note, however, that the ORSA process will evolve significantly over the coming years and that each company will have different risks, structures and will meet the requirements in their own way.

Please refer to Appendix 1 for a Glossary of terms. In addition, the “Administrative, management or supervisory body” referred to in the Solvency II literature was interpreted to be the Board of the company and the term Undertaking is used interchangeably with Company.

## 2 Overview

### **Guideline 1- Principle of proportionality**

*The undertaking should develop its own processes for the ORSA, tailored to fit into its organisational structure and risk management system with appropriate and adequate techniques to assess its overall solvency needs, taking into consideration the nature scale and complexity of the risks inherent to the business.*

### **Guideline 8 - Assessment of the overall solvency needs**

*The undertaking should express the overall solvency needs in quantitative terms and complement the quantification by a qualitative description of the risks.*

As a key element of the Solvency II infrastructure the ORSA is expected to:

- take account for the Company's risk profile, risk limits and business strategy
- demonstrate continuous compliance with the capital requirements
- identify and assess the short and long term risks
- be used in strategic decision making
- be performed regularly and following any significant change to the risk profile
- form part of the regulatory reporting process

Achieving all of these requirements in a balanced way, and at the same time help providing all stakeholders with a real and practical understanding of the risks and the capital required to cover these risks, is not a trivial task. In many respects the challenge will be to keep the ORSA short and focused, in order for it to be useful as there may be a temptation for companies to "write a long report because they don't have time to write a short one".

The principle of proportionality is not intended to suggest shortcuts for smaller companies, but it does allow a sensible approach to be followed whereby a company can decide what is right for its specific risk profile. The important thing is for companies is to justify why an approach was taken. Where a company considers an approach and sets out their reasons for adopting it they should be in a good position to support their decision in the face of board and supervisory challenge.

Guideline eight makes it clear that the risks are expected to be expressed numerically. Under the ORSA process there is an expectation of complete documentation – to the point where companies may not be able to rely on areas which have been insufficiently documented. Traditionally, this is not an area of strength for actuaries, but will be extremely important in the Solvency II world. This should not, however, distract from the fact that ultimately the risks and their solvency requirements need to be expressed quantitatively.

### 3 ORSA Contributors, Users and their expectations

In this section we consider the ORSA stakeholders and ask:-:

- Who are the contributors and users of the ORSA process
- How are they going to contribute to it?
- What are they going to do with it?

**Guideline 2 – Role of the administrative, management or supervisory body (top-down approach).**

*The undertaking should ensure that its administrative, management or supervisory body takes an active part in the ORSA process by steering how the assessment is to be performed and challenging its results.*

**Guideline 6 – Internal report on ORSA**

*Once the process and the result of the ORSA have been signed off by the administrative, management or supervisory body, at least information on the results and conclusions regarding the ORSA should be communicated to all staff for whom the information is relevant.*

**Guideline 14- Link to the strategic management process and decision-making framework**

*The undertaking should take the results of the ORSA and the insights gained in the process into account at least for the system of governance including long term capital management, business planning and product development and design.*

The Board and Management of the company are at the same time users and contributors of the ORSA. This has been reinforced by Guideline 2 above.

It is likely that the Risk Management Function will be responsible for coordinating the overall process. Given its quantitative nature, actuarial skills will be required to provide very significant inputs. Other areas and functions likely to be involved and asked to contribute include the sales, product management, business planning and finance functions along with senior management in general. Each of these will be involved iteratively as their inputs are included and the results used to define further refinements and scenarios.

The ORSA report will also be shared with the Supervisor.



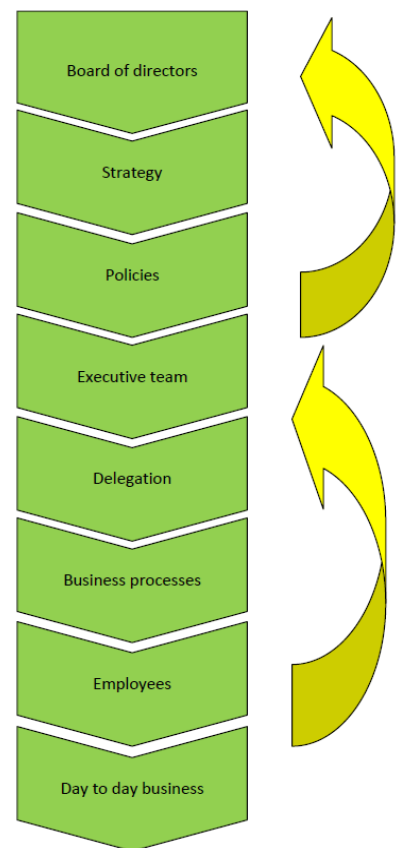
### 3.1 Board

The role of the Board, as owners of the ORSA, is to challenge the assumptions used, processes, scenarios and conclusions and to take into account the ORSA results in their decision process. The Board are expected to fully understand the solvency needs, capital requirements and the significance with which the risk profile deviates from the assumptions underlying the Solvency Capital Requirement, to enable the Board to make informed strategic decisions and manage the company successfully.

The Board will use the ORSA to manage and update structures and strategies as it becomes embedded as the key decision making tool. It is an iterative process where the output can impact all components of the company from the Board down to day to day business as shown in the diagram<sup>7</sup>.

The ORSA process should be such to allow the Board to understand:

- The risk profile of the company and the key drivers of the risk profile;
- If the company will be in line with its risk appetite over the near future
- Whether there is sufficient available capital to support the current business plan
- What risks should be monitored more frequently
- Any material changes to the risk profile over the most recent period;
- Risks not covered in the regulatory Solvency Capital Requirement (e.g. reputational risk and strategic risks, and the significance of these risks);
- Key sensitivities in the company's balance sheet
- Key drivers of expected profits



The output of the ORSA should enable the Board to react early to any market changes rather than proceeding with an out-of-date business strategy.

<sup>7</sup> EIOPA, ORSA-The heart of Solvency II, Groupe Consultatif Summer School presentation, May 2011

### 3.2 Executive Management Team

For the senior management team the ORSA offers the opportunity and the framework for a focused and reasoned risk discussion with the board. Properly conducted it should result in clear strategic risk parameters for management and provide a sound foundation for the company's business planning process.

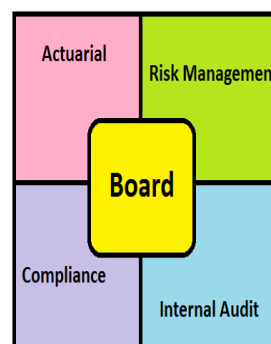
In the initial years it is likely that the key players in the process will learn a lot about the quantification, interpretation and articulation of risks. It will be important that this education and understanding is appropriately spread across the company, management and the board. Companies that don't manage appropriate engagement are likely to end up with an ineffective process.

### 3.3 Key control functions

There are four key control functions identified in the framework directive,

- Risk management, (Article 44)
- Internal control, (Article 46)
- Internal audit and (Article 47)
- Actuarial function (Article 48).

The four functions can be independent of each other (or depending on the size of the company, it is possible that some might be combined). Either way all will be involved in the ORSA process.



Due to the looping and iterative nature of the ORSA process the functions that feed into the ORSA will also have to be informed of the ORSA output as they are directly impacted by any management actions and/ or other decision made by the Board.

#### Risk management function

The risk management function will likely be the overall owner of the ORSA process. It will be responsible for the governance of the process and will contribute to the ORSA by assessing the risks currently faced by the company including short or long term risk. This will include, at a minimum, information on underwriting and reserving, asset-liability management, investments/derivatives, liquidity and concentration risks, operational risk management and reinsurance and other risk mitigation techniques. Additional reporting is required where partial or full internal models are used.

Risk management will report on all types of risk and exposure, any changes to the risk profile since the last ORSA, expected changes to the risk profile in the future and any correlations of risk. As a second line function risk management will also be responsible for assessing the risk analysis. Any risks not included in this analysis should be highlighted by risk management. In this respect Risk Management should consider any emerging risks and recommend whether the company should accept these risks at all and, if so, whether they require additional capital or not.

They should also use the output of the ORSA to feedback into their risk monitoring cycle where action can be taken to address any risk exposure driving significant capital requirements. It would also be

the responsibility of the risk management function to inform the company of any significant changes in risk profile which would/might trigger an additional full or partial ORSA to be completed.

The breadth of the ORSA means that there is significant scope for the process to become disjointed, ineffective or confusing. Clear planning and communication about what is expected will greatly enhance the benefits derived from the process.

### **Actuarial function**

The ORSA is in the main, a quantitative process and it is likely that the actuarial function will be responsible for many of the quantitative elements. It will contribute to the ORSA projections and scenarios, assumptions setting and calculation of the technical provisions and capital requirements.

As the actuarial function is also required to express an opinion, for example, on the underwriting policy and adequacy of reinsurance arrangements, it is expected that the actuarial function will review and analyse the ORSA material and contribute to its conclusions and recommendations. The actuarial function will use the ORSA results to monitor risk and capital requirements.

The calculation of the projections by the actuarial function and assessment of these by the risk management function are critical not only in terms of the final output but also in terms of the process or journey along the way and, as mentioned, it will be useful to involve management in the process along the way and not just at the end.

### **Internal Audit and Control**

The internal audit and control functions form important parts of the overall governance framework. Their role in the ORSA process is likely less direct than either of the two above.

Internal control will contribute to the ORSA by reporting on the robustness of the system of processes and procedures within the company. Similarly the internal audit function will contribute to the ORSA through the evaluation of the other control functions. Issues raised by Internal Audit during the period covered by the ORSA should be commented on in the ORSA if relevant, and should be allowed for within the ORSA where appropriate.

## **3.4 Other key internal functions**

It is worth highlighting other key internal functions who will contribute to the ORSA. In some companies these functions will be the responsibility of different departments.

- Capital management:

ORSA is the process where risk and capital management get together. The capital management function is a fundamental contributor and to the ORSA. It is likely that part of the capital management processes already in place will be incorporated as part of the ORSA process. Capital management will provide the information regarding capital planning for the near future and analyse the results of the ORSA to identify inefficient use of capital and feedback into the capital management process;

- Finance function:  
The finance function and department will contribute to the ORSA by providing input into the balance sheet projections and will use the ORSA results in the day to day management of the business.
- Investment management:  
The investment department will provide asset information and projections into the future, be involved in part of the process such as scenario setting, analyse the output of the ORSA in order to verify the adequacy of the company investment strategy;
- Business planning & development:  
This function will provide business plans that will form a key input for the ORSA projections, and analyse the results to identify areas where plans might need to be refined or changed in light of the ORSA results. Business planning will also use the output to inform the business strategy of the company (such as increasing focus on business with lower capital requirements, selling off business which is tying up capital or where there is a large concentration of risk).
- Product development & pricing:  
Product development will use the output from the ORSA to help design new contracts with better use of capital requirement or risk exposures, identify those contracts which are less favourable and to align pricing and development with the undertakings overall strategy and return on capital.

### **3.5 Supervisor**

The ORSA supervisory report is available to the supervisor in its entirety and will become a key communications document with the supervisor on an annual basis and in the event of non-regular ORSA(s). The ORSA supervisory report will supplement the Pillar 3 Regular Supervisory Report (RSR). It appears that the section on the ORSA in the original guidance on the RSR is now no longer required. The emphasis of the ORSA report will be forward looking, while the Regular Supervisory Report is at a point in time. The supervisor will be able to use the ORSA to assess the overall system of governance for the company and will be concerned with the ORSA process as well as with the numerical output. In addition to assessing the risks that companies are facing the supervisor can be expected to use the output from the ORSA process to assess:

- The scope and nature of risk and capital measurement systems;
- The scope, frequency and requirements of the information presented to the company's management body and evidence of key decisions made based on this information;
- How the company has integrated its internal model into its overall risk management strategy and the level of understanding of the model by the board and the management team;
- The methods used and assumptions made on the determination by the company of its material risk exposures and concentrations;

- The adequacy of the company risk mitigation practices.<sup>8</sup>

The capital result calculated through the ORSA is likely to be different to the SCR requirement. The ORSA capital result is not a regulatory requirement and will not, in itself, result in supervisors asking companies to hold this level of capital even if it is greater than the SCR requirement.

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<sup>8</sup> EIOPA speech entitled *Risk Management – A supervisor’s approach – SUERF – the European Money and Finance Forum – Helsinki – 22/09/2011*

## 4 Policy and Process

### **Guideline 3 – Documentation**

*The undertaking should have in place at least the following documentation on the ORSA:*

- a) ORSA policy;*
- b) record of each ORSA process*
- c) internal report on ORSA;*
- d) ORSA supervisory report*

### **Guideline 4 – ORSA policy**

*The ORSA policy should comply with the guidelines established under General Governance - Written policies- and include additionally at least:*

- a) a description of the processes and procedures in place to conduct the ORSA;*
- b) consideration of the link between the risk profile, the approved risk tolerance limits and the overall solvency needs;*
- c) information on*
  - (i) how stress tests/sensitivity analyses are to be performed and how often are to be performed;*
  - (ii) data quality requirement; and*
  - (iii) the frequency for the performance of the (regular) ORSA and the circumstances which would trigger the need for an ORSA outside the regular timescales.*

### **Guideline 5- General rule**

*The ORSA process and outcome should be appropriately evidenced and internally documented.*

### **Guideline 15- Frequency of the ORSA**

*The undertaking should perform the ORSA at least annually. Notwithstanding this, the undertaking has to establish the frequency of the assessment itself particularly taking into account its risk profile and the volatility of its overall solvency needs relative to its capital position. The undertaking should justify the adequacy of the frequency of the assessment*

It is important that the ORSA process is properly structured, executed, documented and governed. Companies are expected to have a documented policy, a record of each process and a report outlining the results.

The ORSA Policy is the document which outlines the overall aim and approach to be taken for the ORSA, together with the standards and parameters which have to be adhered to, the escalation procedures, reporting requirements, responsibilities and frequency.

The process is a rolling project plan of how the ORSA is completed, the interaction and contributions from different functions, the procedures to be followed, the regular KRI's and triggers to be calculated and monitored, and the reporting cycle. In many cases, the different sub-processes that will be part of the ORSA already exist within companies and the ORSA is the over-arching process which brings them all together.

The ORSA Report is the final output from the process. It may vary depending on the audience and there may be different reports for different purposes. It will be important that the company can provide

a record of the assumptions, methodologies and results for each risk, process and scenario considered.

## **4.1 Policy**

Guideline 4 provides useful guidance on the policy requirements. A written policy should be approved by the board and be properly implemented by the undertakings to achieve an effective system of governance.

Although developing a proper policy is likely to be time consuming, an ORSA policy is required to give insight to and oversight of the board's decision making process and risk understanding as well as ensuring the undertaking has a comprehensive picture of all the risks it is exposed to. It also ensures the necessary level of responsibility by the board/company and a policy will help them in:-

- Deciding the level of documentation needed,
- Deciding the allocation of responsibilities and workflows and
- Identifying the undertakings core business as well as what they believe is required by an ORSA process.

As a result, it is necessary to set out the ORSA policy in such detail as to ensure proper governance and good results.

The policy should:

- Clearly set out relevant responsibilities, goals, processes and reporting procedures.
- Provide justification as to the frequency of the regular ORSA and the circumstances that would trigger a non-regular ORSA.
- Assist the board in its role of challenging the ORSA process.
- Describe how the ORSA process and outcome will be evidenced and internally documented.

An example outline of the ORSA Policy is included in Appendix 3.

## **4.2 Process**

One approach which many companies are adopting when designing their ORSA is to consider the likely output from the process, and then work backwards.

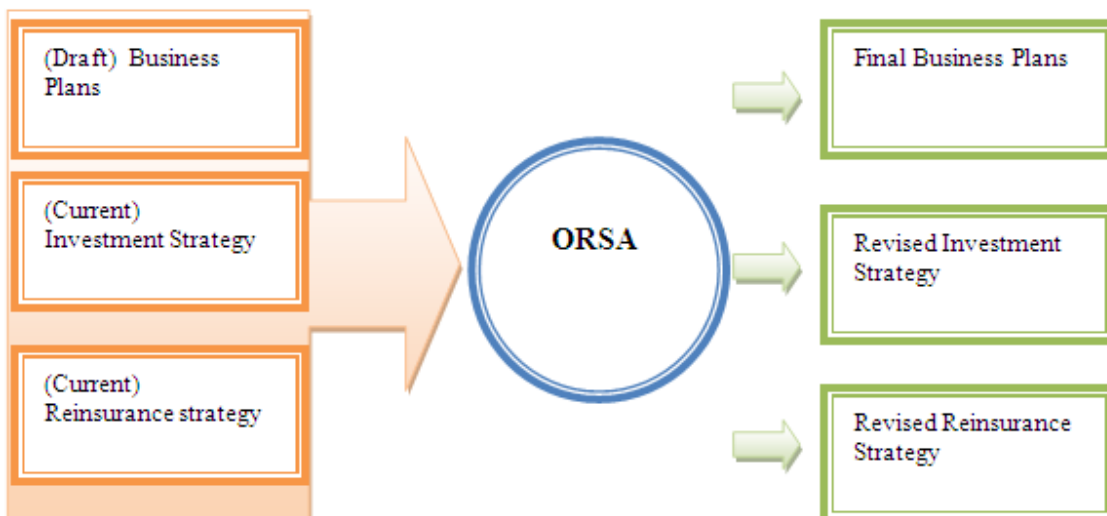
While part of the information to include in the ORSA is more static in nature, i.e. might remain quite stable from year to year (such as the description of the risk management framework or the Risk Appetite), the core of the information that will be used in the analysis will be more dynamic and will require more effort to produce.

It is likely that part of the ORSA process is already in place in some form or another. The existing processes should be leveraged, as this will avoid the effort of redesigning processes and will be appreciated by management. Also, the process does not have to be complex: the principle of proportionality should be borne in mind when designing the ORSA. Undue complexity in the process is unlikely to help the overall understanding of the results.

A practical approach might be to:

- List the expected ORSA output (see Report under 4.3))
- See what information is already produced - Identify all the existing processes produce the above information, or that could be modified to produce other output required for the ORSA
- Design other processes that are required to produce the remainder of the information
- Analyse timing of the existing processes and hard-dates (processes that cannot be moved)
- Analyse how all the processes might interact and the processes that will need to use the ORSA results
- Consider the functions that will need to be involved in:
  - Providing base data
  - Setting assumptions
  - Agreeing stresses and scenarios
  - Refining the inputs following initial results
  - Testing and validating the results
  - Acting on the results
- Consider the personnel that need to be engaged in the process along the way to ensure they understand the final output
- Design the overall ORSA process

As an iterative process, some aspects that feed into the ORSA also will need the ORSA information. As such, timing and timeliness of the ORSA will be extremely important. Timing must allow for the fact that the Company should be using the output of the ORSA and be able to demonstrate such use. The results of the ORSA should form part of the Company's management and decision-making process. The illustration below shows possible processes that both feed and use the ORSA.





More practical considerations also affect the timing of the ORSA. As many projections and sensitivities are required, it would be sensible to schedule the ORSA in a period when the relevant resources are available.

It should be performed on regular basis and one option is for the ORSA to coincide with the business planning cycle. This process should enable the company to review its strategy and amend its future business plans due changes in any of the following: underwriting, price of reinsurance, an increase or decrease in investment returns, concentration of risks or return on capital, to name a few.

Between ORSAs the Company should monitor its risks appropriately and have a clear idea of the events or risk levels that will trigger a non-regular ORSA. Non-regular ORSAs may be triggered by events internal or external to the company e.g. acquisition of another business entity or a market event.

### **4.3 Report**

The ORSA report(s) should at a minimum include<sup>9</sup>:

1. A description of the areas that are included in the ORSA;
2. A description of the process of conducting the ORSA and the responsibilities of key personnel involved in the process;
3. Stress tests used and their results;
4. The amount of overall solvency needs and the financial condition of the undertaking, signed-off by the administrative or management body;
5. Any strategies for raising additional own funds where necessary;
6. A description of the independent assessment and the results of the last assessment;
7. Conclusions and recommendations.

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<sup>9</sup> CEIOPS issue paper May 2008 [https://eiopa.europa.eu/fileadmin/tx\\_dam/files/consultations/IssuesPaperORSA.pdf](https://eiopa.europa.eu/fileadmin/tx_dam/files/consultations/IssuesPaperORSA.pdf)

As previously stated, there's no formal template for the ORSA output as companies are expected to devise a structure that is suitable for that particular company. A possible structure (adapted from a recent industry note<sup>10</sup>) is set out below. An alternative outline of a sample ORSA report is shown in Appendix 2.

1. The company's risk profile
  - a. The company, its business, market and drivers
  - b. Company's risk identification and assessment
  - c. Risk appetite
    - i. capital strategy
    - ii. capital aims in terms of shocks and extreme shocks
  - d. Strategic plan and link to risk appetite
  
2. The Company's current and future solvency position
  - a. The base case setting out the current and forecasted solvency position based on the current business plan.
  - b. Stress testing and scenario analysis
    - i. What could happen and the impact
    - ii. What scenario would render the current capital levels insufficient
  - c. Capital Management Plan
  - d. Risk Mitigation
    - i. Risk mitigation strategies
      1. risks not accepted
      2. risk accepted and managed
      3. risks accepted and mitigated/hedged
      4. subsequent risks taken on as a result
    - ii. Reinsurance strategy
  - e. Management Actions
    - i. Strategic flexibility (expected flexibility within the normal course of events).
    - ii. Management options in the face of more extreme events
  
3. Validation, Challenge and Assessment
  - a. Management review and conclusions
  - b. Board review and challenge to ensure the process' effectiveness and the validity of the outcomes for decision making. Specifically in relation to:-
    - i. Policy
    - ii. Process
    - iii. Scenarios
    - iv. Results
  - c. Reconciliation to SCR and assessment of additional risks considered as part of the ORSA process.
  - d. Evidence of link between ORSA process, strategy and capital management.

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<sup>10</sup> Willis Re: The Own Risk and Solvency Assessment (ORSA): What is it, and why is it good for you?

## **4.4 Analysis and Recommendations**

The analysis of the ORSA projections should focus on:

- Sufficiency of Own Funds to cover capital requirements and qualitative assessment of Own Funds over the projection period (for example, reliance on future profits )
- Qualitative or quantitative assessment of capital requirements for risks not covered in the SCR or Economic Capital calculation
- Liquidity assessment – eg liquid nature of Own Funds, potential collateral calls either to cover reinsurance or derivative positions, quality of collateral received.
- Development of the risk profile versus the Company's Risk Appetite metrics. A key question that the ORSA could address is whether a particular action (e.g. selling more new business than planned or more business of a particular type than planned) could mean the Company remains solvent but is beyond its risk appetite for a given risk or set of risks
- Key risks affecting the Company's solvency position and their likely development over the projection period
- Sensitivities of results to changes in key assumptions
- Possible actions in case of adverse scenarios (including the possibility of raising additional capital). Actions may include – closing to new business, reducing the level of projected new business, changing the type and nature of new business, changing the asset profile of shareholder assets, reinsurance, hedging, merging with another entity within the same Group or potentially even an external party
- Assessment on the validity of assumptions and likelihood of scenarios tested
- Considerations on adequacy of SCR and/or Economic Capital calculations (under Standard Formula and Internal Model, if applicable)
- If applicable, reasons for differences between Standard Formula and Internal Model SCR
- If applicable, reasons for differences between Economic Capital and SCR.

After detailed analysis of the results, recommendations to the Company's Board/Senior Management should be documented. The recommendations should focus on key drivers and cover proposed changes to the Company's Business Plans, if required in light of the ORSA results. They could also cover other aspects, such as proposed changes to Risk Appetite, Capital management, Asset Liability management, Investment strategy, Hedging strategy, Retrocession strategy and, if applicable, the Company's Internal Model.

## 5 Economic Capital

In this section we consider: -

- What is Economic Capital?
- Economic Capital in the standard model
- Developing an internal capital model

### **Guideline 7- Assessment of the overall solvency needs**

*If the undertaking uses recognition and valuation bases that are different from the Solvency II basis in its assessment of its overall solvency needs, it has to explain how the different recognition and valuation bases ensure better consideration of the specific risk profile, approved risk tolerance limits and business strategy of the undertaking, while complying with the requirement for a sound and prudent management of the business.*

*The undertaking should quantitatively estimate the impact on the overall solvency needs assessment of the different recognition and valuation bases.*

### **Guideline 13- Deviations from assumptions underlying the SCR calculation**

*The undertaking may initially assess deviations between its risk profile and the assumptions underlying the SCR calculation on a qualitative basis. If this assessment indicates that the undertaking's risk profile deviates materially from the assumptions underlying the SCR calculation the undertaking should quantify the significance of the deviation.*

## 5.1 Economic Capital

*“As part of its ORSA an insurer should determine the overall financial resources it needs to manage its business given its own risk tolerance and business plans, and to demonstrate that supervisory requirements are met. The insurer's risk management actions should be based on consideration of its economic capital, supervisory capital requirements and financial resources.”*

If the SCR is the regulatory capital which the supervisor requires companies to hold in order to protect policyholders then the Economic Capital is the capital which the company believes is needed to cover its risks, achieve its business plans and protect the future performance and viability of the business. As a result, it is expected that the economic capital will typically be greater than the company's regulatory capital. The directive is clear, however, that the Economic Capital is not a capital requirement.

Calculating and understanding the undertaking's Economic Capital is a fundamental part of the ORSA process, as it provides a consistent way to balance risk exposure and financial resources.

There is no single definition of Economic Capital, but some of the key features are:

- the Economic Capital should be sufficient to meet the business' plans and protect against adverse outcomes
- with a given level of confidence
- over a specific time horizon.

In theory, the choice of confidence level or time horizon should be consistent with the way the undertaking manages its business and its overall business strategy. In this sense the Economic Capital measure can differ from Regulatory capital, which under Solvency II is defined to be the capital required at a 99.5% confidence level over one year.

To calculate the Economic Capital, a model is needed to describe the underlying business, capturing all the assets and liabilities and projecting the development of the business over time using the key risk drivers. A company may develop their own internal model or build on the standard formula model created by EIOPA as part of the preparations for Solvency II.

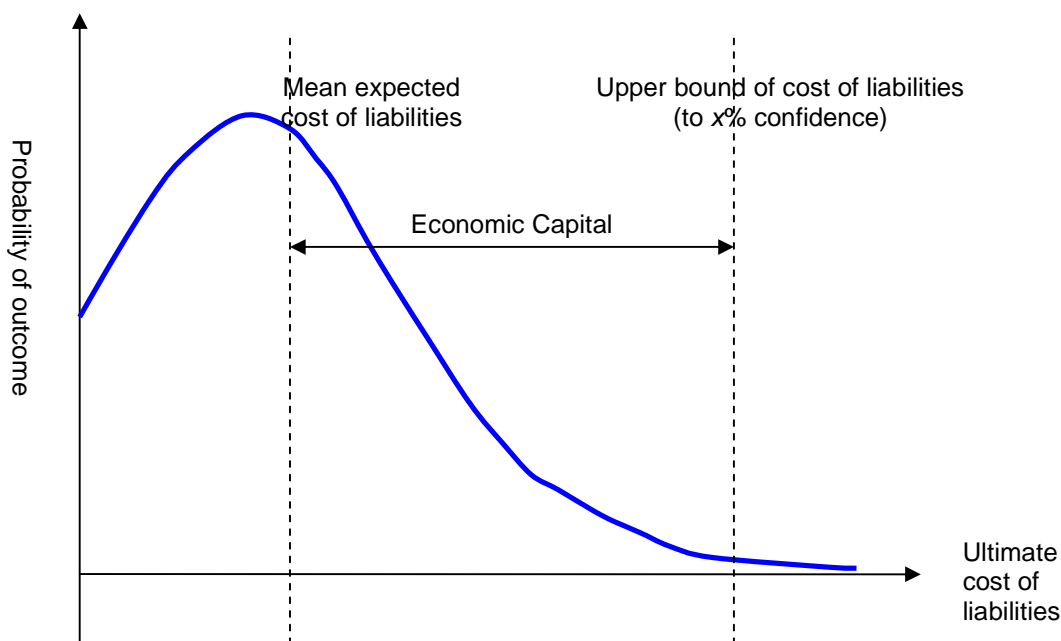
For companies using the standard formula, building an Economic Capital model for use in the ORSA will have the advantage of providing greater understanding of the business and its risks and capital needs, without the overhead of having to go through the Internal Model Approval Process (IMAP).

A good Economic Capital model should have the following benefits:

- Improve understanding of the dynamics of the business being modelled;
- Help the consideration of different asset or liability strategies;
- Understand sources of profitability and the capital used by different business lines; and
- Understand the impact of a possible extreme event on the financial position of the company.

## 5.2 Development of an economic capital methodology

The graph below illustrates the concept of economic capital using the distribution of a range of ultimate outcomes for the cost of a group of liabilities. It compares the expected ultimate mean cost of the liabilities against the upper bound of the cost of the liabilities (to a pre-specified confidence interval), with the gap between the two representing the excess economic capital requirement.



When setting up an economic capital model, each company needs to review its own particular circumstances and decide on:

- The appropriate time horizon to use, consistent with the company's business planning timeframe;
- The desired confidence interval of the model (or additional buffer over that required level);
- The risks to be included in the model and how they can be quantified;
- The overall aggregation of the risks to determine the level of economic capital

In many cases companies will already have a lot of the foundations in place to construct an economic capital model:

- The nature of the standard formula SCR has led to companies putting in place the necessary actuarial models to perform the various stress tests, and has increased awareness of what is a company's best estimate liability, as well as the impact of various risks on the cost of meeting policyholder obligations;
- Companies intending to operate an internal model under Solvency II will have developed what is effectively an economic capital model (typically calibrated to a 99.5% confidence interval over a 1-year time horizon);
- Many insurers in Ireland are subsidiaries of larger insurance groups, and are obliged to report quasi-economic capital results to their parent for consolidation into a group economic capital model. The challenge for these entities will be to investigate how this process could be expanded for the purposes of complying with the ORSA standards.
- Irish life insurers were required by the CBI to implement and embed a risk appetite statement prior to 30 June 2011. This step will have increased insurers' knowledge of their own particular risks and how they can be quantified, both of which will be helpful when it comes to setting up an economic capital model.

### ***5.3 Developing the standard formula into an economic capital model***

Irish insurers are already familiar with the nature of the standard formula SCR calculation the methods it requires to calculate capital requirements ie identification of risks, a series of stress tests, correlation, diversification of results, etc.

Companies will have developed their actuarial models to perform the necessary calculations, and senior management and Boards understanding of how the standard formula SCR calculation works and what drives it.

In order to take this process onto the next level and transform it into the foundation of an economic capital model for the ORSA, insurers will need to look at four specific issues:

- How can we incorporate new business into the assessment of required capital?
- Is the one-year time horizon appropriate?
- Should we instead target a confidence interval other than 99.5% (or what buffer to add in addition to this)?
- Are the specifications of the stress tests in the SCR standard formula appropriate for your own company – both individual shocks or stresses and the aggregation of these shocks/stresses?

In quantifying the risks faced it is important to allow for the interaction between risks. In particular it is now well established that some risks which are independent under normal conditions become correlated under stressed or extreme conditions. This means that the modelling of the economic capital model should allow the company to vary the risk correlation matrices.

Some examples of risks beyond those captured in the Standard Formula SCR that should merit consideration for inclusion in an economic capital calculation for the ORSA might include:

- Pricing risk – lower future new business margins (possibly negative);
- Interest rate volatility – alteration to economic scenarios for stochastic modelling, or addition to cost of derivative assets backing trackers;
- Liquidity risk, sovereign credit risk.
- Equity volatility and basis risk
- Sovereign debt risk
- Changes in legal or fiscal environment; and
- Consolidation of reinsurance market – increase in reinsurance premiums

For the time horizon to be used for assessing the potential variation in the value of liabilities, companies will need to consider the nature of their liabilities and the status of their business. For example:

- a company that is closed to new business may choose to target a horizon of the run-off of their insurance liabilities, rather than limiting it to a 1-year or 5-year period;
- a company writing significant volumes of longevity risk business may wish to adopt a multi-year time horizon to reflect the longer-term nature of longevity risks.

## **5.4 Alternative Confidence Intervals**

The use of alternative confidence intervals is connected with an insurer's risk appetite, and its wish to demonstrate confidence and security to external parties about its financial health:

- The targeted security level should be consistent with the time horizon of the company's economic capital model.
- Companies may wish to hold sufficient capital to cover their liabilities to a confidence interval appropriate to a particular credit rating – a 99.93% to 99.95% confidence interval is typically regarded as being consistent with an 'AA' credit rating<sup>11</sup>.

Using a confidence level other than 99.5% will require the insurer to consider how to specify stress tests and risk distributions at an alternative level to that set out in the Solvency II standard formula. This will require an assessment of the nature and materiality of the risk, as well as the level of data that exists in relation to the distribution of risk outcomes. There are multiple options available to assist companies in deriving the parameters for such stress tests:

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<sup>11</sup> Society of Actuaries (USA) Valuation Actuary Symposium, 2008

- For some risks, the advice produced by EIOPA on the Implementing Measures for the Solvency II Standard Formula will offer guidance on methods and sometimes also a range of parameters. (Examples include the Life Underwriting Risk paper<sup>12</sup> and the Equity Risk Sub-Module paper<sup>13</sup>.) It is worth noting, however, that the derivation of confidence intervals at the tails of the distributions of some of these risks may be somewhat arbitrary in certain instances.
- Companies who are part of larger financial services groups may be able to leverage work performed elsewhere within the groups regarding appropriate stress tests for economic capital calculations calibrated to a given confidence interval. Generally, however, these tend to be more widely available for “economic” risks than for “insurance”-type risks.
- In some cases larger and longer-established companies can avail themselves of their own historic data for the purposes of calibrating stress tests on insurance risks – lapse risk, expense risk, mortality risk. In carrying out this work, insurers can refer to the guidance from EIOPA papers on tests and standards for internal model approval<sup>14</sup>, which set out structures in which such data can be analysed and also how to handle situations where data is sparse.

In practice given the subjectivity behind some of the standard formula stresses and their equivalence to a confidence interval of 99.5% it may be difficult to modify them to a different confidence interval and most companies will have to find different ways to validate their approach.

## 5.5 Evaluation and Validation

Insurers will also be required to evaluate whether or not the stress tests specified in the standard formula SCR are appropriate for their own circumstances and the assessment of necessary capital under the ORSA. This will require two separate pieces of work by each insurer:

- Firstly, a consideration as to whether there are specific risk drivers faced by the company which are not represented in the Standard Formula calculation.
- Secondly, an examination of whether the assumptions adopted by EIOPA in parameterising the Standard Formula are appropriate to the company. EIOPA will publish these assumptions in due course (date currently unspecified), and companies can then compare them against the features of their own business. A relevant example here may be the Standard Formula property value stress, which is a 25% reduction in the value of property investments - given the volatility of the Irish property market in recent years, companies will need to explore whether a “European”-based property stress is appropriate or not.

Where risks are non-quantifiable, the company needs to discuss in its ORSA report how the risks can be managed or mitigated. For the more material of these risks, there will clearly be a greater case for expanding modelling capabilities so that the risks can be quantified in future. This assessment of the risk should be consistent with the actual practice of the company when it comes to handling these risks.

<sup>12</sup> [https://eiopa.europa.eu/fileadmin/tx\\_dam/files/consultations/consultationpapers/CP49/CEIOPS-L2-Final-Advice-on-Standard-Formula-Life-underwriting-risk.pdf](https://eiopa.europa.eu/fileadmin/tx_dam/files/consultations/consultationpapers/CP49/CEIOPS-L2-Final-Advice-on-Standard-Formula-Life-underwriting-risk.pdf)

<sup>13</sup> [https://eiopa.europa.eu/fileadmin/tx\\_dam/files/consultations/consultationpapers/CP69/CEIOPS-L2-Advice-Design-and-calibration-of-the-equity-risk-sub-module.pdf](https://eiopa.europa.eu/fileadmin/tx_dam/files/consultations/consultationpapers/CP69/CEIOPS-L2-Advice-Design-and-calibration-of-the-equity-risk-sub-module.pdf)

<sup>14</sup> <https://eiopa.europa.eu/consultations/consultation-papers/2010-2009-closed-consultations/july-2009/consultation-paper-no-56/index.html>



## **5.6 Use of Group economic capital models**

Many insurers based in Ireland will already perform some variation of an economic capital calculation on a regular basis to report to their Group parent (or to a rating agency). This work can readily be expanded for use for ORSA reporting purposes – whether the actuarial models themselves or the methodology being used. For example Group Economic Capital papers may contain a pre-defined methodology for how to specify distribution of risk outcomes for the purpose of assessing internal capital requirements.

Some Groups may develop economic capital models for use in their business planning exercises, where a Group's operating targets include growing a business's value by reference to some measurement of economic value. This will reduce the burden on companies of having to operate and maintain two sets of forward-looking models, and will also facilitate greater consideration of the interaction of capital requirements and business plans or strategies.

The Group Economic Capital model may not, however, be sufficiently comprehensive or detailed in terms of capturing and measuring the risks faced by the Irish entity of the Group, as it may, to some extent at least, be based on a specified set of risks applicable to all of the business units of the Group or operate to a higher materiality threshold than would be appropriate for the Irish entity.

Some of the specific issues that need to be considered when adapting a Group Economic Capital model for use locally for the ORSA are:

- Comparison of the risks allowed for in the Group model against those relevant to the Irish entity;
- Identification of the reasons why any risks existing in the Irish company have not been allowed for in the Group model – immaterial, unquantifiable, assumed to be held elsewhere within the Group;
- Review of the confidence level and time horizon of the Group model to assess whether they remain suitable for the Irish entity;
- Assessment of the parameters used in the Group model to measure exposure to various risks, and whether they should be altered to be made more “Irish-specific”; and
- Appropriate allowance for intra-group risks

## **5.7 Practical obstacles**

While there are plenty of stepping stones available for companies when initially developing their ORSA modelling capabilities, there are several also practical difficulties that insurers will face in performing the Economic Capital calculations for the ORSA:

- Availability of sufficient actuarial resources (both in the initial development of the ORSA and when performing it on an ongoing basis) and the timing of ORSA work to fit in with other demands on financial reporting departments;
- The need to identify suitable methods of approximation within the overall model of the business (for example in relation to tax or capital fungibility);
- The addition to the Economic Capital model of risks not considered in the Standard Formula SCR will bring with it the challenge of having to set an assumption for the aggregation of those risks (including correlation and diversification), and this can be a highly technical area.
- Allocation of capital to individual products and risks (i.e. dis-aggregation of overall capital)
- Availability of IT resources, which will be particularly of concern to those companies developing stochastic models obtaining sufficient data to perform the necessary analyses every year to justify the various parameters in the ORSA model, and the development of processes to record and gather such data on an ongoing basis;
- The need to build a model that is sufficiently clear to be understood by senior management and the Board so that it can feature as a key practical tool in the management of the business on an ongoing basis.

A company's Economic Capital model may suggest a need for higher capital than what is required under the Standard Formula. Regulators cannot, under the legislation as currently drafted, force companies to hold capital levels in excess of the SCR based on the results of the ORSA.

## **5.8 Additional Information**

Appendix 4 includes some further information of extreme scenarios, measures such a VAR and TVAR also some key validation principles that could be applied when companies are projecting their Economic Capital requirements. It also includes some comments on Economic Capital software tools.

## 6 Economic Capital and Risk management

The key questions considered in this section include:-

How will economic capital be used in the risk management system and ORSA?

How does the ORSA help you decide what capital buffer you might need?

How might the ORSA help a Board justify and articulate the level of capital it needs (back solve; stress times a factor, rating agency, increase stresses, reduce diversification benefit).

### **Guideline 4(b) – ORSA policy**

*The ORSA policy should comply with the guidelines established under General Governance - Written policies- and include additionally at least consideration of the link between the risk profile, the approved risk tolerance limits and the overall solvency needs;*

An undertaking's risk appetite framework is an important element of the ORSA. Risk appetite statements express the Board's willingness to accept downside risk of losses versus the upside expectations of profits. Ideally the risk appetite will include tolerance levels defined using the Economic Capital or Solvency Capital Requirement (SCR). As set out in Principle 4b of the guidance the ORSA policy should specifically contain a consideration of the link between the risk profile, the individual risk tolerance limits and the overall solvency needs.

Broadly speaking, the aim of the SCR is to protect policyholders by ensuring that, even after a 'one in two hundred year event' (99.5% confidence) undertakings will have sufficient assets to cover their technical provisions. A company's Board will, however, require a higher standard to ensure the successful continuation of the company as a profitable enterprise for shareholders and a secure employer of its staff and hence set a target capital above the regulatory capital. The ORSA should consider all aspects of the risk appetite and risk tolerance.

An articulation of the company's target capital policy is also useful. For example, a company may decide that it wants to hold sufficient capital to remain viable following significant adverse stresses but acknowledge that in certain extreme scenarios its levels of capital are only sufficient to ensure that existing policyholders will be secure.

A description of the drivers of capital in the business in the ORSA will help the Board and management understand the potential impact of business decisions and whether margins are required in risk appetite statements. The projections of economic capital will then help the Board and management decide if their business plans are consistent with their risk appetite statements.

### **6.1 Consistency with risk appetite statement**

The risk framework of an insurer forms the boundaries of an Economic Capital model, as it describes the nature and magnitude of the risks faced by the company; clearly all of the significant risks identified in the risk management framework should be allowed for in the EC model underlying the ORSA and sufficient reporting should be provided from the EC model to identify where breaches of risk limits may occur alongside qualitative consideration of whether the non-quantifiable risk limits may be breached.

There will be reasons why not all of them are ultimately modelled explicitly within the ORSA (e.g. the risks cannot be quantified, they are too extreme, etc.) but documentation should explain why any of them have not been included.

A company's ORSA Policy is required to describe the link between the company's risk profile, its risk tolerance limits, its business strategy and its overall solvency needs (as set out in Guideline 4b). The connections between the business strategy and the risk profile should already be captured in a company's risk appetite statement, as are the risk tolerance limits, and this provides companies with a strong start to this piece of the ORSA Policy. Where additional work may be necessary is in relation to the connection between strategy / risks and solvency needs.

Part of the process of defining the Economic Capital model is to agree on a methodology for modelling the capital required to cover the risks being run by the insurer. The risk appetite statement will specify risk tolerances and risk limits using particular measurements (e.g. earnings-at-risk, variation in net asset value) and the methodology for the Economic Capital model should be consistent with the quantification of these risks in the risk appetite statement.

### ***Stress and scenario testing***

Stress testing is another area where it is important to ensure consistency between the ORSA and the risk appetite statement. The risk appetite statement will set out the Board's views on the key risks it is running, and its willingness to retain or mitigate those risks.

The design of stress and scenario testing within the ORSA should reflect the profile of risks identified in the risk appetite statement (and any additional risks within the company that were not captured in the risk appetite statement) with the key risks being subject to the most focus. Companies should apply a mixture of "realistic" stresses and more extreme tests, and the balance between these two should again be consistent and proportional to the nature of the various risks faced by each insurer. In preparing the scenarios, it will be important not to let consideration of the more extreme outcomes dominate any assessment of the more probable scenarios which are more likely to materialise and will be a more realistic projection of the path of the company.

Operational risks will also feature within a company's risk appetite statement, and the stress testing should identify the occurrence of various operational risks (and the associated impact) that has been identified in the risk appetite framework.

The scenario testing to be performed should be based on senior management assessment of realistic future paths for the business, both optimistic and pessimistic and covering both micro- and macro-economic issues, and to include "real life" scenarios – for example an extended contraction of the Irish life assurance market, a "Japan-like" interest rate scenario for Europe, etc. This is an example of how the ORSA can be further integrated within a company's business planning cycle, allowing the company to examine how the results of the ORSA may change under the different business planning scenarios under consideration, which in turn will provide evidence to the company of the appropriateness of the business plan in the context of the company's appetite for risk. As part of this process it is useful to consider not only changes to assumptions but also the conditions that could lead to such changes and the subsequent implications of such a scenario.

Reverse stress testing (or testing to destruction) is also seen as a valuable tool for the ORSA, in which companies seek to model the answers to the questions of "What events would need to happen for the company to breach its risk appetite statement?" and "What chain of events would need to happen for the company to have insufficient capital?". In this case the outcome is decided and the test is used to

determine the level at which the outcome can be expected. Reverse stress testing serves also as a helpful way of validating the choice of stress tests and scenario tests on which the ORSA is based. This is discussed further in Section 8 of this paper.

Finally, the Board needs to challenge the choice of methodology and assumptions adopted for stress and scenario testing.

## **6.2 Risk Register/Reporting**

A Risk Register is a common method to summarise all the risks faced, giving an assessment of likelihood and severity etc. The regular risk reporting would then include an update to the Risk Register on a regular basis. The Risk Register can be used in the ORSA process by focusing on the risks identified as being of most significance to the company.

Using Economic Capital as a risk measure allows all risks, for which Economic Capital can be calculated, to be compared on an equivalent basis and can help boards ensure they have sufficient available Economic Capital to meet the economic capital required by the risks to which they are exposed.

For example, a company may have limits set for its exposure to certain market risks in its investment guidelines, such as a maximum allocation to corporate bonds of rating BBB or below. But in addition the model would calculate an economic capital requirement for market risk. The riskier the asset portfolio the higher the capital required. So the company could also set limits on the riskiness of its investment portfolio in terms of economic capital. Decisions to change its investment guidelines (such as increase the allocation to riskier assets) could then be discussed in terms of the impact on future capital requirements and the availability of capital. Although no model will be foolproof in this respect, it will provide a useful lens through which companies can discuss relative risks.

Using stress and scenario testing on risk exposures allows a better understanding of the risk drivers and reverse stress testing helps explain how much deviation from expected the company can tolerate with the economic capital it has available. For example the ORSA could try to make statements such as, all else being equal, the company could suffer a 40% equity fall and still maintain at economic capital coverage ratio of 100%.

## **6.3 Risk management system**

The ORSA will also include an assessment of the risk management system and whether the system is suitable for managing all the risks faced. Where there have been breaches of individual risk limits or the overall risk appetite of the insurer, these and the actions taken would be described. Any suggested improvements in the overall risk management system would be described and the expected benefits explained.

The understanding of the risks faced provided by the ORSA should encourage management to invest in improving the risk management system and by extension the capital modelling.

In assessing the future risk exposure of the insurer the ORSA can consider active risk mitigation activities that are in place. These can include reinsurance or loss sharing arrangements or potentially inter group support. Also future management actions can be accounted for but an assessment of the likelihood or ability to take future management actions would be included in the ORSA.

## **6.4 Use of Internal Model calculations**

Under Solvency II, internal models can be used by companies to determine their SCR. These internal models are examples of economic capital models and in order for an internal model to be approved by the regulatory authorities for use under Solvency II, each insurer must demonstrate and justify, amongst other things;

- The process by which the company's risks have been identified, and the key risk drivers understood;
- How data has been collected for the purpose of parameterising the internal model and what statistical analysis techniques were used;
- The aggregation of risks;
- The relationship between the company's governance structure and the level of capital;

All of these issues are also relevant to the ORSA, where companies will need to consider the same topics in the context of measuring economic capital. As mentioned previously, under the ORSA companies have the option of using an alternative risk measure, confidence interval or time horizon for the ORSA calculation, and therefore may need to alter the parameters or calculation methods used in the internal model.

The existence of an approved internal model does, however, provide companies with a significant head-start in terms of model design, connections between risk appetite and capital requirements, and data / statistical analysis of risks.

EIOPA strongly believes that the ORSA serves a beneficial purpose with regard to the ongoing validation of a company's Internal Model, and when companies are adapting their Internal Model for the purpose of calculating economic capital for the ORSA, it will be important that the process that is followed will act as a challenge to the existing structures and assumptions of the Internal Model, rather than just assuming they remain valid.

As is the case for companies operating under the Standard Formula, EIOPA is requiring insurers to produce a reconciliation of economic capital against the capital required for compliance with Pillar 1 standards under the Internal Model.

## 7 ORSA Projections

The questions considered in this section include: -  
What do the ORSA projections need to cover?  
How to do them and different methods you could use.

### **Guideline 10- Forward-looking perspective**

*The undertaking's assessment of the overall solvency needs should be forward-looking and at least cover separately each year of the business planning period.*

Projections provide quantitative information for the ORSA. The main objectives of the projections are:

- Inform the calculation of the Economic Capital;
- Validate whether the Company has sufficient resources to remain a going concern over a time horizon longer than 1 year;
- Allow decision-making to be informed by expected solvency cover levels and risk exposures compared to risk appetite - for example decisions regarding the Company's business plans, reinsurance, investment or hedging strategy;
- Assess the impact on the balance sheet of changes in the current risk drivers;
- Assess the balance sheet impact of risks to which the Company is not currently exposed, but that may develop in the near future;
- Assess the impact of risks not included in the Standard Formula or Internal Model Solvency Capital Requirement (SCR) calculation.

### **7.1 Time horizon**

The number of years to be projected is expected to be left to the Company's discretion. However, it is reasonable to align the ORSA projections with the length of the Company's business plans. To this extent, projections would likely cover a 3 to 5 year period. This doesn't mean that asset and liability cash flows should be projected for this period only: the time horizon of the cash flow projections should be as long as the underlying business requires it to be. The focus of the risk and solvency assessment would be on the first 3 to 5 years, and metrics such as solvency cover and risk appetite exposure would need to be calculated for this period only.

It is important to distinguish between the time horizon for the calculation of Economic Capital and a projection of Economic Capital into the future. This may be best illustrated by referring to the standard formula SCR calculation with which many actuaries are familiar. The standard formula SCR attempts to measure the level of capital that should be held to cover the value-at-risk of an insurer's own funds over a 1-year time horizon (subject to a confidence interval of 99.5%). The projection term for the ORSA, which will be consistent with a company's business planning horizon, instead refers to the period of time over which a company assesses its ability to meet its own assessment of required capital (where such capital could for example be based on a 1-year time horizon).

## **7.2 Content**

Projections should at least include the main components<sup>15</sup> of the Economic Balance Sheet, the SCR (calculated under the Standard Formula and, if applicable, under Internal Model), and the Minimum Capital Requirement (MCR). It would also be useful for the projections to include risk appetite metrics, in order to allow evaluation of the Company's risk profile against its Risk Appetite in future years and under various scenarios. It may also be useful to project the P&L account. Depending on the complexity of the business and decisions informed by the ORSA projection of the assets should be split into the relevant asset classes and be consistent with the Company's investment strategy and policy over time. A comparison of Risk Tolerances, SCR and P&L over the time horizons of the projections will assist the Board in understanding the risks they are taking and the expected returns they will receive in return for taking these risks. Projection of the liabilities should also allow analysis at line of business level. The level of granularity is something that needs to be decided on by the Company.

## **7.3 Methodology**

How would the projection of the Economic Balance Sheet over future years be done in practice? This presents a similar problem to the calculation of the risk margin component of technical provisions under the Cost of Capital approach. Simplifying assumptions may be required in order to limit projections run-times and complexity of calculations, both in case of stochastic projections or deterministic projections.

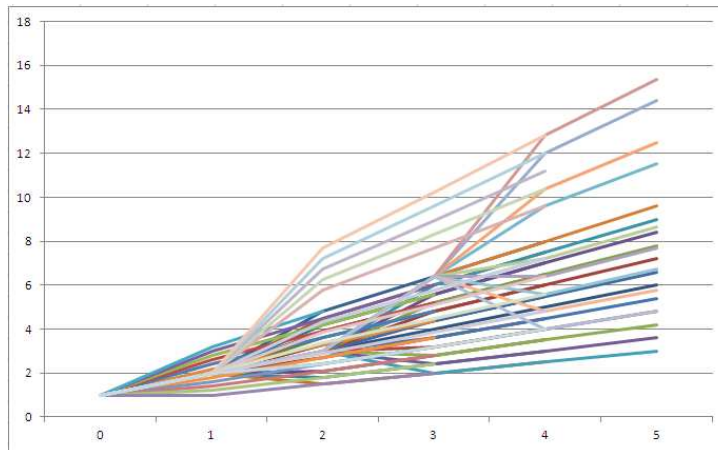
To give an example, under a deterministic projection, calculating the SCR for Risk X at time 0 means projecting all future cash flows under best estimate assumptions and also then under shocked or worst-case assumptions, discounting both and taking the difference. To calculate the SCR for this same Risk X at time n, the future cash flows for the worst-case need to reflect best estimate assumption developments for the first n years, then reflect both worst-case and best estimate assumption for periods beyond time n. Doing this for each time period required and for each risk driver could be quite cumbersome. In some cases, it might be possible to simplify these calculations by applying some pro-rata adjustments for calculating the capital requirement for periods beyond 0.

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<sup>15</sup> At a minimum: Assets, split by asset class and material asset type, Best Estimate Liabilities by material line of business, Risk Margin, Own funds, by tier.



The chart is an attempt to illustrate the complexity of the projection over multiple time periods.



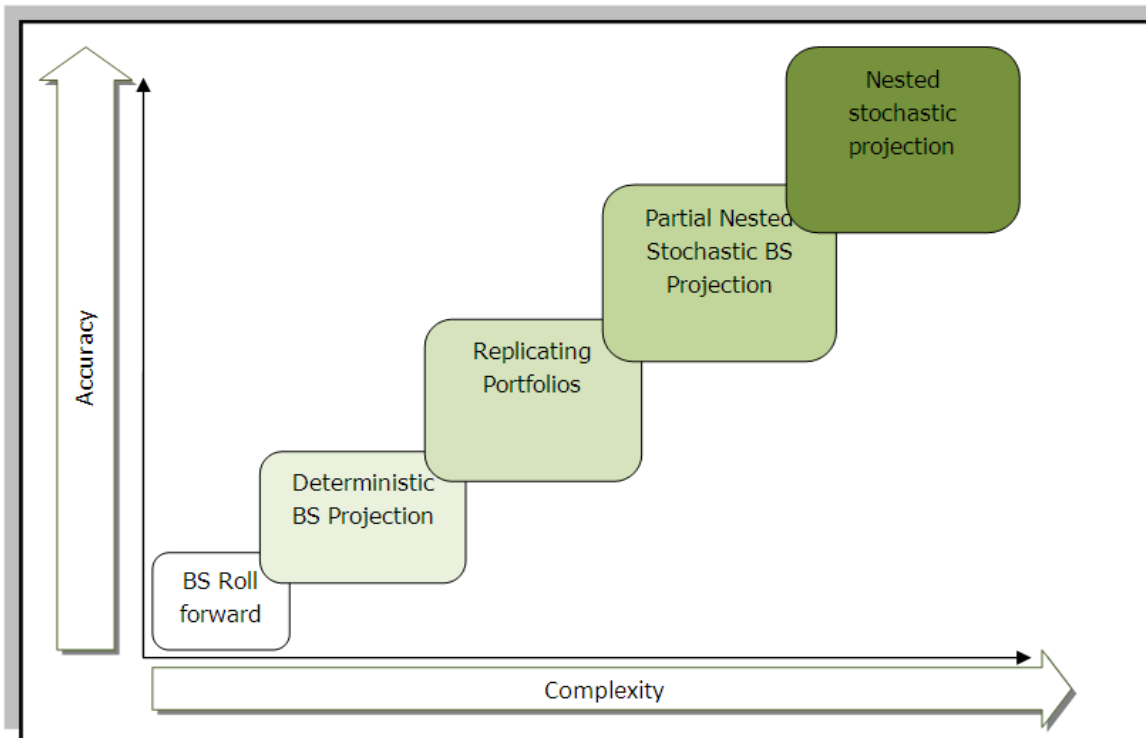
The limits of any simplifying approaches should be understood and documented within the ORSA, together with plans to enhance and improve the projection methodology being used (if required). All projection methodologies can be criticised and questioned - the important thing is to understand the deficiencies and document them clearly.

Various approaches can be adopted for the projections over future years, from less complex and less accurate methods and to more accurate, but more time consuming and complex methods. When choosing a method for projecting the Economic Balance Sheet, it is worth bearing in mind that:

- The method should be adequate to the nature, scale and complexity of the risks being modelled. More complex methods are likely to be required by only a handful of companies, such as those who already have stochastic models in place.
- While simpler methods might be less accurate, they are easier to implement and generate results more quickly. This will be a great advantage in the use of the ORSA, for business decision making and strategy setting. It would also give more flexibility to the frequency of the ORSA.
- A phasing approach could be taken, whereby a Company might start with the simplest method and gradually refine it over several years. This is also true for the rest of the ORSA process.

An outline of various methods that could be used is provided in the sections below. The list below is not exhaustive: these are just a few examples from a wide range of possibilities. The graph below illustrates the same methods, mapped onto a complexity versus accuracy scale.

Generally speaking, we expect that companies who are not currently performing stochastic calculations to value their business will likely decide to follow the “Balance Sheet roll-forward” or “Deterministic Balance Sheet Projection” approaches, unless the company is planning significant changes to its future business mix (such as the sale of products offering investment guarantees) or has identified a pressing reason why more complex approaches should be adopted.



*Illustration – Examples of Balance Sheet projections on a complexity/accuracy scale*

### 7.3.1 Balance Sheet roll forward

This entails adjusting the latest Balance Sheet for expected future developments without carrying out any real projection, or perhaps by carrying out partial projections. For example, reserves could be scaled up to take account of future new business and assets could be adjusted to take into account future expected net profits or losses. Indicators reflecting the Company's main risks could be used to project SCR and Economic Capital into the future. This method is very simple, intuitive and easy to implement but it may not produce accurate results. Depending on the complexity of the business this method may be sufficient as a starting point. This method may also be easy to communicate and operationally is not complex or cumbersome.

In some cases companies will have a good knowledge of the surplus that is expected to emerge over time allowing the overall capital position to be estimated into the future. In these cases this approach can provide a very useful control check on the results from more sophisticated projections.

### 7.3.2 Deterministic Balance Sheet projection

This method involves projecting assets and liabilities on defined deterministic paths to simulate development of the portfolio over the projected time horizon.

The forward projection of a full balance sheet may, even using deterministic methods, be challenging for companies with diverse product ranges or system constraints. As with the "Balance Sheet Roll-forward" approach, indicators reflecting the Company's main risks could be used to project SCR and

Economic Capital into the future. This could potentially be done, for example, by projecting the development of key risk drivers in future years and applying simplifications of the SCR calculation based on the relationship between the risk driver and each SCR risk module (or sub-module) as at the most recent valuation date. Some examples of how this might be done were contained in the QIS5 technical specifications, particularly for the various life underwriting sub-modules. In terms of investment-related risks, companies may wish to consider projecting risk drivers such as:

- Unit fund values, under the assumption of a constant mixture of asset types (equities, property, bonds, etc.) and currencies within them unless this would be invalidated by any changes anticipated in the company's business plans;
- Asset exposures outside of unit funds could be based on projected levels of technical reserves for non-linked products, although again companies would need to make certain assumptions regarding the duration profile of such assets and also how counterparty exposures would develop over time;
- Or other alternatives based on risk metrics taken from a company's risk appetite statement.

Clearly any such approach would need to take account of the significance of various risks, and while approximations may be appropriate for less material risks, a company would need to satisfy itself that the treatment was suitable for its most significant exposures. This method is simple to implement (in terms of IT capacity, run times involved and required development) and it is likely that much of the infrastructure already exists for other purposes such as business planning, Financial Condition Reporting, ALM.

This method should be appropriate for many lines of business, especially products that do not have complex guarantees or options. Care is required that risks are not missed by adopting this approach.

### **7.3.3 Replicating portfolios**

Depending on the level of detail used, this method could be used to approximate the projections. It involves the development of a replicating portfolio for the liability side of the balance sheet and a simple projection of this portfolio. The assets in the replicating portfolio are assumed to be held to maturity, the weights are chosen to match the cashflows of the liabilities as closely as possible. The assets in the replicating portfolio should be exposed to the same risk drivers as the liabilities (e.g. bonds in case of fixed or relatively stable cashflows, liability guarantees and options could be replicated using derivatives instruments), and have prices readily observable in the market.

One limitation of this method is that there may be inaccuracies in the construction of the replicating portfolio and these will have to be understood. Replicating portfolios need to be updated or at least validated on a regular basis. Depending on the types of liabilities in the portfolio, it may suffice to do so once a year and when a material change to the liability profile takes place (e.g. sales of a new product type, closure of an existing line of business, new product lines resulting from mergers or acquisitions).

### **7.3.4 Partial Nested Stochastic Projections**

This involves choosing a number of particular scenarios or paths and projecting the balance sheet on these chosen paths – e.g. a best estimate growth path, a path where markets fall sharply and a path where high inflation is a factor. Paths should be chosen with due regard to the main risks the Company is exposed to, which will depend on the type of business insured. Qualitative and quantitative validations of the paths or scenarios chosen are required: as the number of paths or scenarios on which the Economic Balance Sheet is projected is limited, it is possible that a key issue or risk may not get captured with this approach. For each of the chosen paths, stochastic projections are run in order to calculate SCR and Economic Capital. Run times are more manageable than the full nested approach, but still very time consuming and challenging from an IT perspective. Considerable model development is required, and validation of the model output is complex.

To limit run times, this method could be applied to a sample of policies or selected model point rather than to the full portfolio, in which case the appropriateness of extrapolating the results to the whole portfolio would have to be validated on a regular basis. This approach adds insight depending on the paths chosen and also depending on how results are communicated to the Board and senior management.

Compared to a full nested stochastic approach, communication of results may be easier. This is an important point: an increase in complexity may result in difficulties in ensuring results are fully understood by Board members and senior management.

### **7.3.5 Full Nested Stochastic Projections**

This method involves starting with stochastic projections at time zero, then for each simulation having new stochastic projections starting at time 1, and so on. The number of simulations with this method grows exponentially. For example, if the number of initial simulations is 1,000, by time 1 the number of simulations would be 1 million. This is the most complex method, and in theory the most accurate, provided that the approximations used in the projections are valid. It is probably only suited to the most complex type of business with embedded options and guarantees, such as variable annuities and with profits business.

This approach requires expert resources and involves a considerable effort in model development, testing and validation.

As run times could be onerous, it is unlikely that this approach would be applied to the whole portfolio, but rather to a number of sample model points or a grouped portfolio, depending on the term of the business and the complexity of the calculations. Additionally, Economic Scenario Generator (ESG) issues can arise in terms of convergence/ numbers of scenarios used at each time period of the projection/storage of results/validation of results

Depending on the underlying business type, model change and version control also needs to be considered. For example, in a variable annuity context, changes to the daily/weekly hedging model need to be reflected in the nested stochastic model, which means constant updating is required

Also depending on the number of outer loop scenarios used, it can be difficult to manage and store the output in terms of file size. This aspect of the model development needs to be thought through as part of the design phase in advance of running the model and using model output.

So whilst in theory this approach is the most accurate, in practice, this will be outweighed by the disadvantages of:-

- the requirement to make simplifications and approximations
- the time it takes to produce results
- the difficulty in articulating and understanding the results.

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#### **Practical example**

For companies that insure non-volatile business, a balance sheet projection might be a suitable approach. Let's see how this could work in practice for a company using the standard formula for calculating the SCR, with an ORSA time horizon of 3 years.

Step 1: Select best estimate assumption for projecting assets and liabilities over 3 years.

Step 2: Project best estimate assets and liabilities over 3 years, including new business according to the company business plans, and incorporating any other strategic action of the company over the time horizon. The projections need to be at a sufficient granular level to allow the calculation of the SCR.

Step 3: Using the projections, construct an Economic Balance Sheet at time 1, 2, 3.

Step 4: Calculate the SCR at time 1, 2, 3 and compare it to the Economic Balance Sheet.

Step 5: Based on the main risks the company is exposed to, develop assumptions for "stressed" projections. The assumptions might be related to deviations in one or more risks from best estimate, lower or higher than expected new business sales, historical scenarios. Note these assumptions would not necessarily be calibrated to a 1-in-200 year event, as the objective is not to calculate capital requirement at this stage. Objectives would vary from company to company. One objective could be related to what type of event or scenario the company would want to be able to withstand and still be able to cover its SCR.

Step 6: Repeat the projections for all the stressed scenarios selected at step 5.

Step 7: Construct the Economic Balance Sheet at time 1, 2, 3 for all the stressed projections.

Step 8: Calculate the SCR at time 1, 2, 3 for all the stressed projections and compare it to the Economic Balance Sheet.

## 8 Scenarios

### **Guideline 9 - Assessment of the overall solvency needs**

*The undertaking should subject the identified risks to a sufficiently wide range of stress test/scenario analyses to provide an adequate basis for the assessment of the overall solvency needs.*

As part of assessing the solvency position of the company a few years into the future, the company will calculate the required Economic Capital and perform stress and scenario testing on this capital.

These stress tests could be performed as part of the regular projections and can take account of future management actions. While certain management actions could be assumed in each scenario, the inverse could also be true: future management actions could be developed using the scenarios themselves, by testing the optimal response that the Company could give to a certain event (e.g. raising capital, selling certain types of assets). Future management actions should be realistic and the projections should allow sufficient time for their implementation.

Set out below are examples of possible scenario types.

- Scenarios to facilitate business decisions:

In order to make use of the ORSA process in the day to day management of the business, it would be useful to include scenarios that would help decision-making, such as various levels of reinsurance cover, variations on the business plan, various investment strategies. Although strategies might be driven by reasons other than risk and capital management, these types of projections would be useful in assessing and understanding any shortfalls in the current strategies.

- Selected stress tests:

Stress tests should be developed by analysing the main Company's risk drivers. Tests should represent severe, but likely events. The diversification assumed between risks when calculating the SCR should also be stress-tested. For Internal Model users, stress tests (amongst other things) would inform the validation of the Internal Model SCR appropriateness which is in the scope of the ORSA.

- Selected scenario tests:

Scenario tests should be developed, on possible future economic developments (such as recession and inflation scenarios), Business Plan scenarios (such as "what if" scenarios: lower than expected sales, higher than expected expenses), and combinations of them.

- Reverse stress-tests:

Reverse stress-test involves back-solving to identify events that would reduce the company's Own Funds to zero. Reverse stress tests on the main risk drivers provide useful information and are easy to explain to the company's management. Comparing these to the selected stress tests gives insight into the company's ability to withstand adverse events. Unlike the previous examples where the outcome is determined by the scenario, reverse stress testing (or testing to destruction as it is sometimes called) involves identifying the outcome and using that to determine the scenario. Identifying the scenarios that would cause a company to fail can be very useful in understanding the key risks and level at which they will impact. In itself, reverse stress testing is not necessarily expected to result in additional capital requirements.

The ORSA should also consider scenarios that are not quantifiable or can only be estimated in terms of their impact – a flood event, a terrorist event, a severe market event e.g. Ireland leaves the euro. A qualitative assessment of these scenarios and their impact will also be valuable. The choice of scenarios should be connected to a company's analysis of its sources of historic profit / loss and also take account medium and longer-term risks. The scenarios should be linked to the overall risk management framework of the Company: for example, some scenarios could be selected based on risk assessments or on the recommendation of emerging risks enquiries. For subsidiaries, care should be taken that scenarios set by the parent adequately capture the local risks (e.g. due to materiality thresholds).

The process used to set the above stress and scenario tests should be documented and subject to appropriate governance.

## 9 Continuous Monitoring

Questions in this section include:-

- How often should an ORSA be performed
- When a non-regular should be triggered
- How should companies monitor between ORSAs

### **Guideline 11- Regulatory capital requirements**

*The undertaking should ensure that the ORSA includes:*

- a) procedures that enable the undertaking to reliably monitor its compliance on a continuous basis with regulatory capital requirements whilst taking into account potential future changes in the risk profile and considering stressed situations;*
- b) processes and procedures to allow the undertaking to monitor and manage the quality and loss absorbing capacity of its own funds over the whole of its business planning period.*

### **Guideline 12- Technical provisions**

*As part of the ORSA process the undertaking should ensure that the actuarial function provides input concerning the continuous compliance with the requirements regarding the calculation of technical provisions and the risks arising from this calculation.*

Article 45.1 requires, amongst other things, insurance companies to assess “the compliance, on a continuous basis, with the capital requirements.

The ORSA report should include demonstration of the Company’s continuous monitoring of its solvency position. It is expected that most Companies would already have in place a process to monitor the current (Solvency I) solvency position.

It is also important that the Company is able to demonstrate the existence of these processes. This means that the processes would have to be documented and that there needs to be a clearly identifiable output. The ORSA Policy should establish reporting requirements in relation to continuous monitoring, and escalation procedures in case the result of the monitoring would indicate a solvency position below specified targets.

There are several approaches that can be taken to monitor the Company’s solvency. What follows are some examples.

### **9.1 Key risks indicators**

These are indicators based the main risks the entity is exposed to, readily available, which would enable an assessment of the SCR and Economic Balance Sheet upon risk movements. For example:

- Multipliers could be used to calculate the effect of movements in interest rates on assets and liabilities;
- Levels of equity or property holdings within unit funds;
- New business volumes, either at an aggregate level or for individual products which may lead to concentrations of risks



- Aggregate death benefit levels, which may affect both insurance risk exposures and counterparty risk exposures if reinsurance is used;
- Fixed interest asset values or other indicators of exposure to counterparty risk
- Expense volumes, which may also serve as an indicator of exposure to operational risks (e.g. if a company expands too quickly);
- Exposure to lapse risk is measurable by different risk indicators for different products – unit fund values, aggregate sums assured on protection products.

The sophistication of any such key risk indicators should be proportionate to the significance of each risk.

## **9.2 Sensitivities and scenarios**

A sufficient number of sensitivities for the main risk drivers would enable the company to estimate the solvency position following a movement in on the risk drivers. The difficulties arise when multiple risk drivers change (in which case sensitivities on individual risk drivers would not suffice) and when the effect on the Company position is non-linear (therefore hard to interpolate/extrapolate). ORSA projections and scenarios would also be useful in this context, so it is important to consider the continuous monitoring requirement when developing projections and scenarios.

## **9.3 Partial model run**

A partial model run could focus on the part of the business that is most volatile or that is exposed to recent events. A partial run could also address specific risks only and leave others constant.

## **9.4 Full model run**

Depending on the capabilities and complexities, a full model run could be completed at regular intervals for the purpose of continuous monitoring.

## **9.5 Triggers**

It is important to consider in advance what flags and indicators will result in escalations and actions and what these will look like in practice. Considering the steps that a company should take in advance of a risk event occurring will provide the company with a very useful roadmap to consider when required.

## 10 In Conclusion

The ORSA process is something that each company must consider from the perspective of its own business, taking account of the nature, scale and complexity of the risks it is running. Notwithstanding the suggestions in this paper the Working Group notes that there is no prescriptive approach on how an ORSA should be performed. Instead we believe that there are a number of key principles that companies should follow in their ORSA projects:

- The ORSA is a wide-ranging exercise, covering all of the key control functions in a company, and firms will benefit from identifying all of the stakeholders at an early stage and engaging them in the ORSA project;
- Companies will find it helpful to use the ORSA Policy document as a tool for planning how to approach the ORSA, as the list of areas that should be considered in the ORSA Policy covers a lot of the key issues that will feature in a project plan for the ORSA.
- The ORSA requires companies to develop an approach to the calculation of internal economic capital, which will be a new calculation for many companies (although most will already have existing building blocks that can serve as a foundation). Companies should consider the specific risks that they are faced with and place the greatest emphasis on modelling the most important risks.
- A challenge the ORSA poses is how to connect the outcome with the management and strategy of the company. Existing operational processes may need to be reviewed, in areas such as business planning or significant decision-making, to ensure that the ORSA can be embedded within the business.
- The use of stress tests and scenario tests can add a lot of value to the ORSA process, where there is sufficient challenge to the choice of tests and where there is a demonstrable link to the business of the company.
- The breadth and depth of the ORSA is likely to mean that developing a successful, functioning ORSA will require an iterative process with companies engaging in trial runs in advance of the first formal ORSA submission.

Finally, companies shouldn't forget that many of the processes required, likely already existing within the company and, in addition, they should remember that a well conducted ORSA does offer the potential benefits of<sup>16</sup>:-

- better risk awareness and foresight
  - more insightful decision making
  - forward looking and proactive risk management
- management focusing attention on the risks that matter
  - looking at regular, current and relevant information
- increased alignment of risk appetite and business strategy
- Improved capital efficiency
  - Reduced cost of capital through better management of volatility
  - Uncover natural hedges
- the benefits of an internal model, without the formal approval process

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<sup>16</sup> ORSA – Bigger Picture Thinking, Niamh Hensey

## Appendix 1: Glossary of Terms

- Regulatory capital requirement: The SCR as calculated by an insurer (using either the standard formula or an approved internal model) plus any capital add-ons required by the CBI.
- Economic Capital: The level of capital an insurer judges it needs to hold in order to meet its obligations (including those arising from new business volumes) under the company's business plan with a specific degree of confidence over a particular time horizon (e.g. 99.9% confidence over a 1-year horizon).
- Available capital (own funds): For the purpose of this paper, available capital is assumed to be the excess of assets over liabilities (being the technical provisions plus other liabilities) as valued in accordance with Solvency II standards. We recognise that companies, when performing the ORSA, are free to value their assets and liabilities in their economic capital assessment (but not their SCR monitoring) under alternative methods if this can be justified.
- Target capital: As part of a company's risk appetite statement, an insurer may state that it wishes to maintain its available capital at or above a specified minimum level. This may be expressed by reference to the Solvency II SCR requirement (e.g. 110% of SCR) or else just by reference to the economic capital requirement (e.g. 105% of the economic capital requirement).

## **Appendix 2: Skeleton outline of an ORSA report**

This appendix outlines the possible content of an ORSA report<sup>17</sup>.

### **Introduction and background**

- Definition of the ORSA
- Purpose
- Ownership
- Scope and limitations
- Contact details
- Independent review
- Sign off

### **Executive Summary confirmation statement**

This should provide an overview of the high level strategy in context of the overall risk profile. Management should be able to confirm that:

- The current risk profile is understood and appropriate for the nature of the business and within the risk appetite of the insurer
- Solvency capital requirements and technical provisions during the reporting period have continuously been met (or if not appropriate action was taken and inform the Supervisor)
- The insurer's current point in time capital and solvency position is appropriate
- If an internal model has been used is it appropriate for risk management and strategic decisions throughout the period
- The key drivers of the risk profile are understood
- Capital plans to meet the solvency position projected over the required planning period are appropriate including under stressed conditions

### **Summary of ORSA Process for the period**

- Governance process around the ORSA including challenge and debate

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<sup>17</sup>Majority of the outline is taken from a Lloyds publication. [http://www.lloyds.com/The-Market/Operating-at-Lloyds/Solvency-II/Information-for-managing-agents/Guidance-and-workshops/~/\\_/media/Files/The%20Market/Operating%20at%20Lloyds/Solvency%20II/Dry%20run%20guidance/ORSA%20section%209%20updated%20Sep10.pdf](http://www.lloyds.com/The-Market/Operating-at-Lloyds/Solvency-II/Information-for-managing-agents/Guidance-and-workshops/~/_/media/Files/The%20Market/Operating%20at%20Lloyds/Solvency%20II/Dry%20run%20guidance/ORSA%20section%209%20updated%20Sep10.pdf)

- When has the internal model been re-run and why
- When have the assumptions been reviewed challenged and changed
- Actions management has taken to keep within risk appetite (instances when outside)
- When has the internal model been used strategically and what changes of strategy have there been?
- What have been the material changes to risk profile?
- Any breach of solvency levels?
- Independent validation of the ORSA process

### **Capital and Solvency Position and stress testing**

- Point in time (reporting date) capital and solvency against SCR
  - summary of capital allocation for each risk category
- Statement of sufficient eligible own funds
- Explanation of the differences between the internal model SCR, and the standard formula
- Results of stress and scenario tests

### **Forecast Capital and Solvency position**

- Results of capital and solvency assessment
- Analysis of movement over the year
- Capital and liquidity plans (including contingency plans) under base case, stress tests and adverse scenarios
- Projected capital and solvency position over business planning period (3-5 years)
- Projected liquidity requirements over the same period

### **Risk Management**

- Risk Profiles – material exposure, concentration, mitigation and sensitivity
- Risk appetite statements
- Key changes to the external environment
- Update on the risk strategy
- Summary of all instances of breaches of risk appetite

- What are the key risks and issues that been identified (internal and external)
- What are the future risks and key dynamic drivers of change (within planning horizon) that have been identified?
- How comfortable is the insurer that all risk mitigation works?

### **Economic Capital model**

- Description of the model
- Key assumptions
- Model validation
- Methodology to assess risks not included in the model
- Limitations of the model and planned improvements
- Reliance on expert judgement

### **Appendices**

## **Appendix 3: ORSA Policy**

This appendix outlines the possible content of an ORSA Policy (Guideline 4).

### **Scope**

### **Objectives of the ORSA**

### **ORSA process**

### **Criteria and techniques for the ORSA**

- Measure
- Time horizon
- Projection period
- Stress/sensitivity analysis
- Continuous monitoring
- Data quality requirements

### **Other processes related to the ORSA**

### **Links to the risk management framework**

- The ORSA in the context of the risk management framework
- Links between ORSA, risk appetite and risk tolerance limits
- Links between ORSA and target capital

### **Use of the ORSA results**

### **Frequency of a regular ORSA**

### **Triggers for non-regular ORSA**

### **Escalation procedures**

### **Roles and responsibilities**

### **Reporting**

### **Policy reviews**



## **Appendix 4: EC Validation and Software Tools**

### ***Evaluation and Validation***

Another important area where an Economic Capital measure can differ from the standard model approach is in the consideration of extreme scenarios beyond the chosen confidence level. For example, two measures may consider one-in-two-hundred year events (99.5% confidence) over a one year time horizon. One model may only be interested in what level of capital is required to survive the losses caused by the particular event which is at the 99.5% point on the distributions of outcomes. This is a straight Value at Risk (VaR) measure.

An alternative Economic Capital measure may look at all the events that can happen beyond the chosen confidence level. This is called the Expected Shortfall or Tail VaR and reflects just how bad the risks that an insurer faces can get in extreme scenarios. So the capital required is the amount required to cover losses for an average extreme event, once an extreme event happens. The extra information needs to be balanced with the accuracy of the model in extreme events where there will be little or no data to accurately calibrate the risks faced.

CP56 published by EIOPA (“Tests and Standards for Internal Model Approval”) in October 2009 contains a number of chapters on the statistical quality standards and validation of internal models (calibrated to 1-in-200 over 1 year). It lays out some key principles that could be applied when companies are projecting their economic capital requirements, including:

- How to apply a combination of statistical analysis and expert judgment when assessing risk variability;
- The process for deciding on probability distributions of various risk outcomes, and how it is not necessary to decide on a full continuous distributional forecast but rather companies can use a distribution with fewer data points
- Identification of any shortcomings or limitations in data underlying the assumptions
- Assessing the sensitivity of output of distribution forecast to changes in underlying data or assumptions made by the company in the course of modelling
- Documentation of all the procedures used in arriving at the distribution assumptions, including the validation (which forms an important part of the wider ORSA documentation)
- Identification of dependencies and connections between risks.
- The level of focus on tail outcomes of risks.

### ***Economic Capital software tools***

Various consultancy and IT firms have launched software products to assist insurers in performing economic capital calculations and embedding them into their business management processes. These belong in two main areas – economic scenario generators (“ESG”) and risk aggregation models.

Economic scenario generators are available to companies seeking to produce stochastic projections of investment market-related variables. ESG’s generally provide companies with projections of key investment market variables (interest rates, equity indices, foreign exchange rates) in future years under many scenarios, and are generally calibrated to either a “risk-neutral” basis, which, if market-consistent parameters are used, is appropriate for the measurement of technical provisions and SCR

under Solvency II, or a “real world” basis<sup>18</sup>, which is more appropriate for generating distributions of potential outcomes of these same variables.

The risk aggregation software systems seek to make it easier for insurers to perform economic capital calculations by giving them tools and methods to:

- Calculate risk exposures at multiple levels of detail
- Aggregate capital requirements from individual marginal stresses
- Report on multiple confidence intervals

It is worth mentioning that insurers who purchase these software systems still have to go through a process of calibrating the models to their own circumstances, and will need to demonstrate that the systems provide an appropriate method of modelling their own position for an ORSA.

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<sup>18</sup> See the presentation made to the SAI on 1 February 2010 for an explanation of “risk-neutral” and “real-world” economic scenarios.

## **Appendix 5: Working Party Membership**

The membership of the Working Party that prepared this paper was comprised of the following:

- Liam Dempsey
- Colm Guiry
- Cherith McClelland
- James McKenna
- Richard McMahon
- Viviana Pascoletti
- Dave Roberts (Chair).



## **THE SOCIETY OF ACTUARIES IN IRELAND**

Clanwilliam House, Clanwilliam Place, Dublin 2, Ireland

tel: +353 1 634-0020

fax: +353 1 634-0039

email: [info@actuaries.ie](mailto:info@actuaries.ie)

website: [www.actuaries.ie](http://www.actuaries.ie)