

A person is silhouetted against a vibrant sunset sky, juggling several balls. The scene is set on a beach with waves in the background. The sky is filled with orange and yellow clouds, and a bright sun is visible on the horizon.

The Actuarial Profession
making financial sense of the future

GIRO Conference and Exhibition 2012
Juggling uncertainty the actuary's part to play

20 September 2012

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making financial sense of the future

GIRO Conference and Exhibition 2012

ORSA working party 2012

Chris Smerald, Natasha Regan

Embedding the ORSA process

“It is crucial that the administrative, management or supervisory body (AMSB) is aware of all risks the undertaking faces, regardless of whether the risks are included in the SCR calculation or whether they are easily quantifiable or not and that the AMSB also takes an active role in the ORSA process, directing and challenging the performance”
(CEIOPS Level 3 ORSA Guidance Consultation)

“CEIOPS’ advice

3.29. The undertaking’s system of governance shall:

a) Establish, implement and maintain effective cooperation, internal reporting and communication of information at all relevant levels within the undertaking;”

(CEIOPS Advice for Level 2 Implementing Measures on Solvency II: System of Governance)

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So What is the Difference Between ORSA and Risk Management? Maybe This?:

- Degree:
Think of ORSA as a distillation to critical risk and governance issues.
- Focus:
ORSA has an especial solvency
- Purpose:
To ensure risk is an integral part of business strategy.

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A brief history of the ORSA working party focus

| | |
|-------------|--|
| 2010 | What a ORSA process might look like? (covering ORSA directive; ORSA process; roles + responsibilities; and template ORSA report sections -a lead in to process identification) |
| 2011 | Business processes underling ORSA (covering Level 3 guidance; practical challenges of: Risk appetite, capital calculation and allocation, business models) |
| 2012 | <u>LINKS</u> between the business processes and the ORSA report and framework (covering top-down and bottom-up mapping of the ORSA processes; and practical case studies of detected events + scenarios and how they might impact the ORSA) |
| 2013 | What next? (some suggestions: how to interact with exec vs. non-exec board members; write a paper; prepare an ORSA for a segment of the insurance industry using publically available data collaborating with risk professionals?) |

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Today's agenda

- An update on what others are doing – survey results
- Deeper understanding – an ORSA mapping framework
- Case studies
- Take away – updated template ORSA report headings

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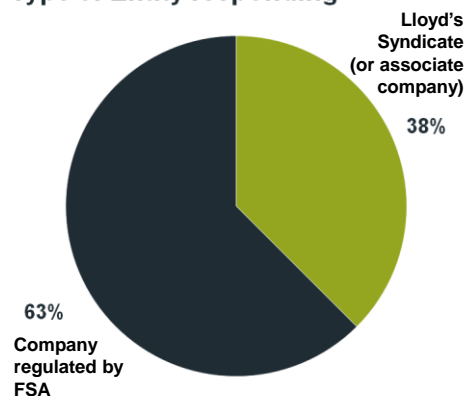
Survey results

Survey designed to focus on

- Progress to date; and
- ORSA Processes

Based on 16 responses

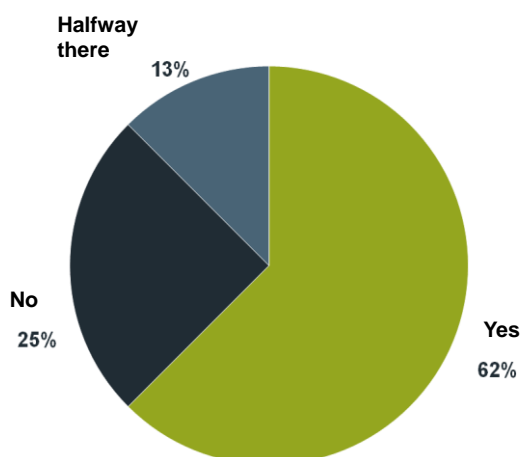
Type of Entity responding



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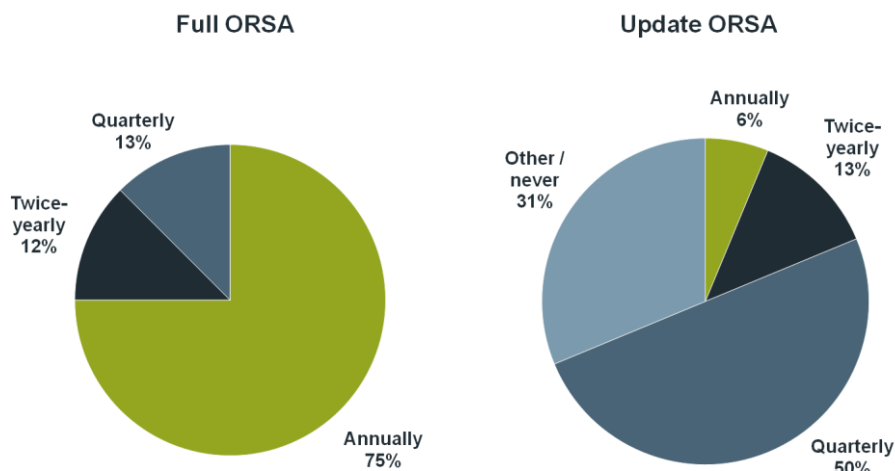
Have you drafted your first ORSA report?



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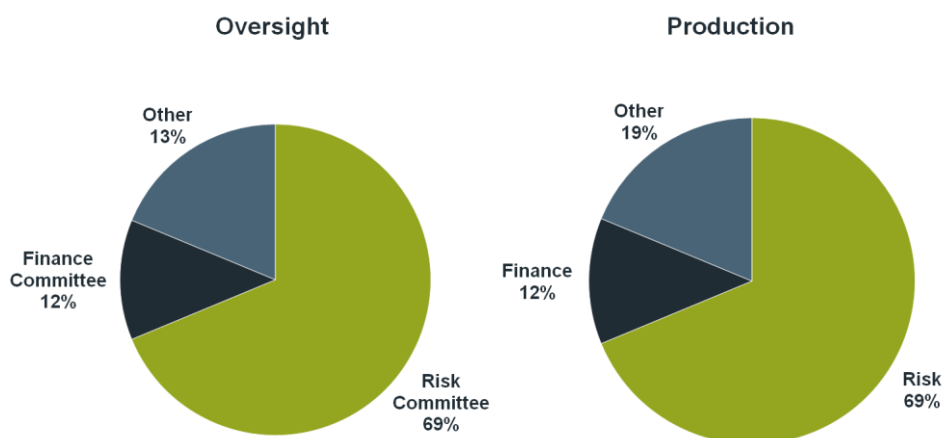
Approximately how often do you plan to produce a full ORSA?



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Who is responsible for oversight and production?



Majority produced by the Risk function and overseen by the Risk Committee

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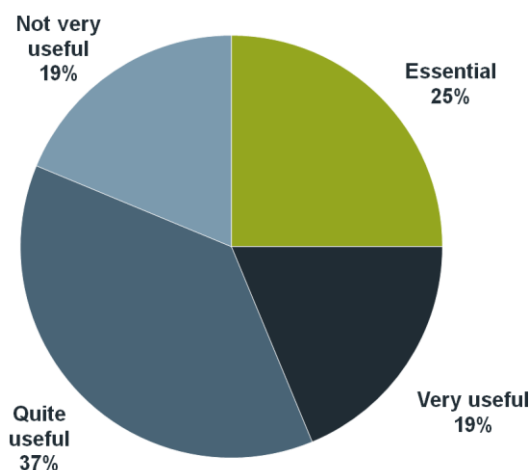
Other feedback

- 3 year time horizon dominates (73%)
- Length ORSA report typically 50 pages or less
- But many with substantial appendices (hundreds of pages)
- Few have used it in decision-making yet (< 25%) – although interestingly those who said they had generally hadn't completed their first ORSA report

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In your view, how useful is the ORSA process for running an insurer?



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Understanding the ORSA process

"The art of simplicity is a puzzle of complexity."

Douglas Horton - on religious unification

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ORSA Processes: Major Groupings

- A: Governance and Assurance
- B: Risk Profile
- C: Business Strategy
- D: Financial
- E: Project Management

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Indicative report headings that capture underlying processes

| # | Report Section | "Inspiration" |
|----|---|----------------------------------|
| 00 | Executive Summary | n/a |
| A0 | Overview of ORSA Process | L3 G4 |
| A1 | Risk / General Governance and Communication | L3 G3 |
| A2 | Data Quality | L3 G3 |
| A3 | ORSA Capital Calculation Methodology | A44: 1, A44: 3; L3: G7 |
| A4 | Compliance With General Obligations | IP 55B; L3: G1, G8; L2G: 3.254 |
| A5 | ORSA Assurance | IP 55E |
| B1 | Risk Identification and Assessment (Incl. Ranking) | A44: 2 |
| B2 | Risk Appetite, Tolerance & Risk Strategy | A44: 1(a) |
| B3 | Risk Profile Monitoring | A44: 1(c), A44: 5 |
| B4 | Risk Profile Recommendations Arising From The ORSA | A44: 4; IP: 55E |
| C1 | Business Strategy | A44: 1(a); IP: 55D |
| C2 | Stress and Scenario Testing | A44: 2 |
| C3 | Strategic Decision-making & Incentives | A44: 4; L3: G6 |
| D1 | Reporting Date Capital and Solvency Position & Projections of | IP: 55D |
| D2 | Own Funds, Technical Provisions, Economic Balance Sheet, & Income Statement | A44: 1(b), A130: 2; L3: G11, G12 |
| D3 | Capital, Liquidity and Related Planning | L3: G14 |
| E1 | Assessment And Tracking of ORSA Action Items & Residual Issues | A44: 4 |

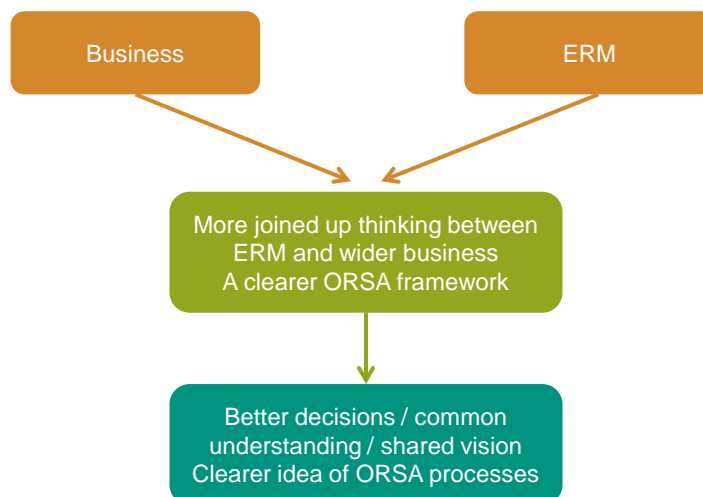
Key to "inspiration": A=Directive Article Number; IP=ORSA Issues Paper; L3=Level 3 Guidance

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Further Comments on Indicative Report Sections

| # | Report Section | Comment |
|----|---|--|
| 00 | Executive Summary | Overview of key items |
| A0 | Overview of ORSA Process | How does the ORSA process work? |
| A1 | Risk / General Governance and Communication | Mainly static discussion of how risk & general governance underlying ORSA works + any changes contemplated or initiated |
| A2 | Data Quality | Review or ORSA impacting data issues |
| A3 | ORSA Capital Calculation Methodology | Capital model design assumptions, limitations, ORSA basis mapped to SCR / IM if different, Key Other Assumptions, Governance Issues |
| A4 | Compliance With General Obligations | Excludes capital, investment and technical provisions; includes general policyholder, proportionality, other regulatory & legal, etc |
| A5 | ORSA Assurance | Review of ORSA process effectiveness + Internal & External Independent Review |
| B1 | Risk Identification and Assessment (Incl. Ranking) | What are the top risks? |
| B2 | Risk Appetite, Tolerance & Risk Strategy | How much risk is acceptable given strategic goals and realities? |
| B3 | Risk Profile Monitoring | What is the current and future risk profile? |
| B4 | Risk Profile Recommendations Arising From The ORSA | How should the risk profile be managed? |
| C1 | Business Strategy | What are the strategic goals, plans, business model, and performance |
| C2 | Stress and Scenario Testing | Identification + analysis of the convergence of business risks, external factors & more traditional risks. |
| C3 | Strategic Decisionmaking & Incentives | What Business Strategies should be followed (including reinsurance to the extent not covered in risk profile recommendations)? |
| D1 | Reporting Date & Projected Capital and Solvency Position | Core ORSA calculations around capital and liquidity requirements |
| D2 | Own Funds, Technical Provisions, Economic Balance Sheet, & Income Statement | Amount and quality of financial assets and liability estimates, sensitivity and stresses around them, and compliance with related requirements like technical provisions, ALM and prudent person |
| D3 | Capital, Liquidity and Related Planning | Management of planned and shock movements of capital requirements, assets, liabilities and liquidity |
| E1 | Assessment And Tracking of ORSA Action Items & Residual Issues | Management and monitoring of past and current ORSA generated strategies |

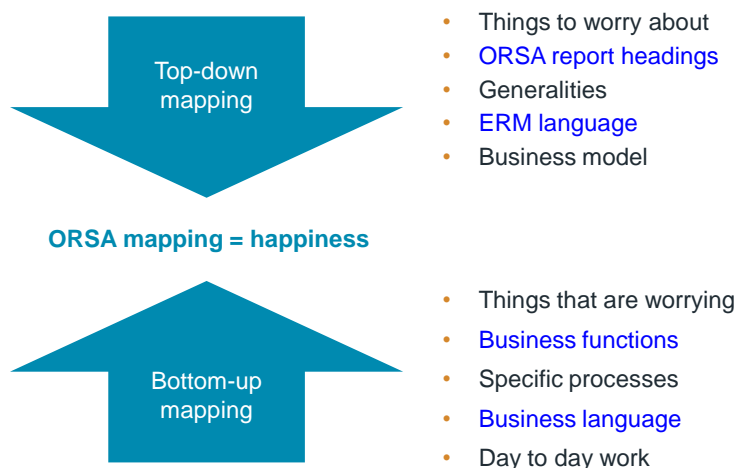
ORSA mapping – objectives



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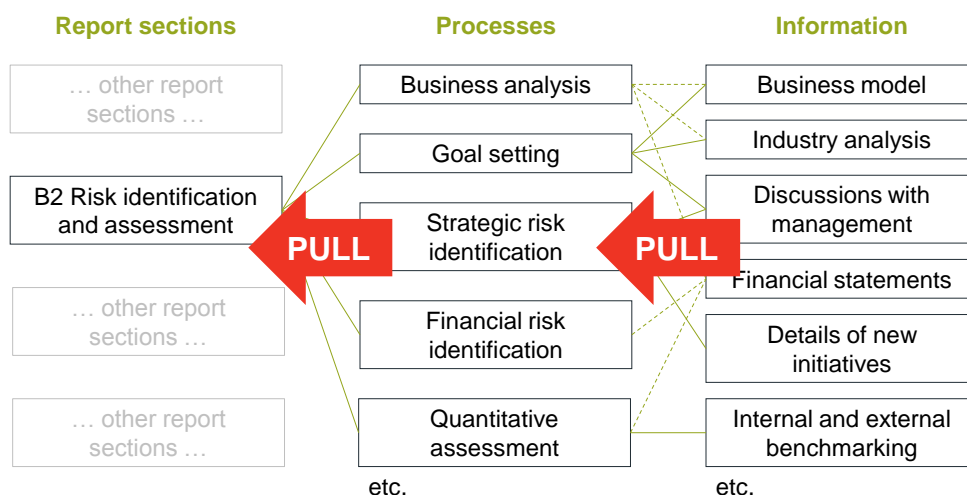
ORSA mapping – the theory



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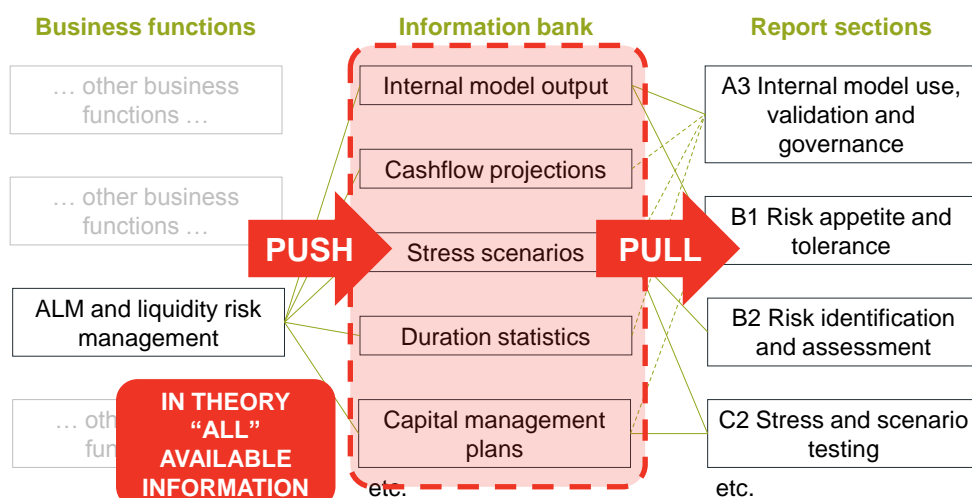
A simple example – top-down mapping (report section mapping)



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A simple example – bottom-up mapping (business function mapping)



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Example detailed process mapping – Part 1

Based on A5 Assurance

| Workstream | Process | Information Owners | Information | Example |
|--------------------------------------|---|---|---|---|
| ORSA Information and issue Gathering | Board and Sr. Management Strategy and Planning ("top down") | Board, CEO, Bus Unit Heads, ERM | Permanent Issues logs, New Issues log, scenarios, board agendas | positive: a review of key ORSA referrals and non-referrals, shows a good referral process |
| | Internal and External Risk, Capital and Other Requirements ("Top Down") | Board Sr Mgt., ERM, Actuarial, Investments, Compliance | | |
| | Internal issues & data gathering ("bottom up") | ERM, business units | Internal Risk event logs filtered for ORSA relevance, ad hoc strategic and planning situations (filtered for relevance) | negative, no investment identified issues despite a volatile Euro |
| | External issues & data gathering ("bottom up") | ERM, business units, emerging risks committee, consultants | External Risk event logs filtered for ORSA relevance, ad hoc industry and customer strategic and planning situations (filtered for relevance) | Positive, a comparison of top 10 risks from a well regarded chief risk officer publication |
| ORSA Collaboration and Analysis | Calculation & analytic processes | ERM, actuarial, capital management, Investments, business Unit Heads | Output of analyses | positive,; analysis relied on for ORSA was well reasoned and documented and included different parts of the business |
| | Collaborating and feedback | Board, CEO, Bus Unit Heads, ERM, actuarial, capital management, Investments | diaries, minutes or other records of discussions, revision histories | negative: investment impact scenario solely performed for internal analysis with no discussion with investment function |

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Example detailed process mapping – Part 2

Based on A5 Assurance

| Workstream | Process | Information Owners | Information | Example |
|---|--------------------------------|--|---|--|
| Governance, Decision-making & Documentation | Ownership & Culture Validation | Board, CEO, Bus Unit Heads, ERM & compliance | participation results, performance reviews | negative: stale issues reporting indicates lack of participation by key business function |
| | Policy Validation | Board, CEO, Bus Unit Heads, ERM & compliance | Policy Documents, ORSA policy, monitoring & exceptions | Positive: board committee "self audit" analysis of exceptions (things not run through ORSA) identifies business model area that would benefit from more structured risk informed management analysis |
| | ORSA Based Decision-making | Board, CEO, Bus Unit Heads, ERM | Decisions taken as result of ORSA process | negative: significant new product decision made before ORSA input received |
| | Successes & Exceptions | Board, CEO, Bus Unit Heads, ERM | Impact of decisions tracked over a reasonable length of time, exceptions monitoring (e.g., no decision reached) | positive: important decisions not run through ORSA have written documentation why and a plan to follow-up with tracking and ORSA process improvements |
| Audit | Internal or external audit | compliance, internal audit, external audit | detective reports, audit results | positive: Audit finds that the ORSA process is excellent, but sees ways for increased synergy |
| | Action point monitoring | data owners, internal audit, external audit | issues logs | positive: Synergy recommendations are planned, and monitored |

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Example workstream – Stress and Scenario testing

- Top down mapping to assess fitness for purpose
 - A3 - Scenario testing to validate the Internal Model and tail correlations
 - B1 - Stress testing of business plan against risk appetite
 - D4 - Stress testing of capital plan for strategic decisions
 - B2 - Stress testing as part of risk control framework
 - Emerging risks
 - Logging of issues
 - Management actions, triggers and contingency plans
 - D3 - Reverse stress testing around defined key triggers eg- capital requirement

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Case study 1 – emerging events

- Examples of emerging events
 - Effects of global warming, together with predictions of an active hurricane season, and increase in cat model estimates
 - Recessionary impact on claims and investments
 - Age discrimination legislation
- ORSA mapping process
 - Capture known impacts together with material risks
 - Incorporate input from all relevant business functions
 - Financial stability, management actions, contingency plans

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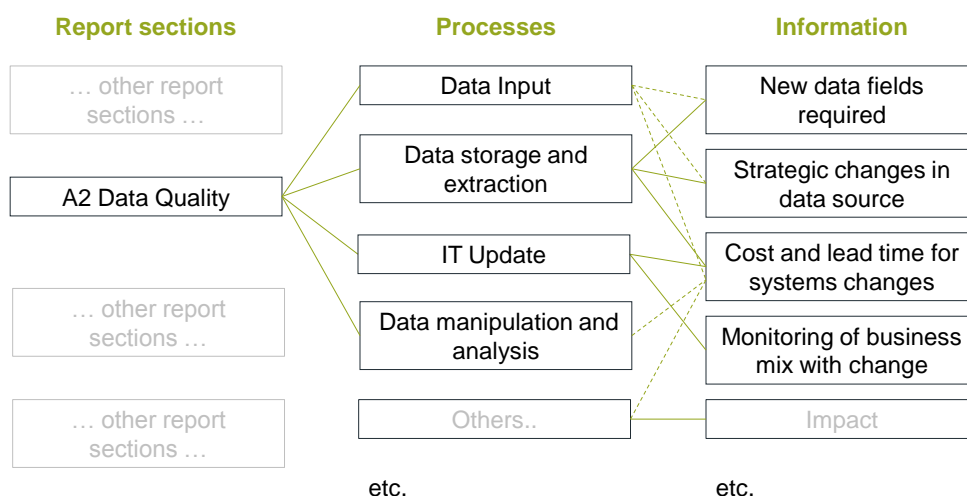
Age discrimination legislation

- An emerging event – Age Discrimination Legislation
 - “Solvency II is now live and EU legislation has not stopped. Parliament has ruled that from 1/1/2015 it will not be legal for insurers to use age as a rating factor due to it being discriminatory”
 - You are preparing the ORSA for your company, a small/medium personal lines insurer, and you wish to capture the effects of this emerging event.

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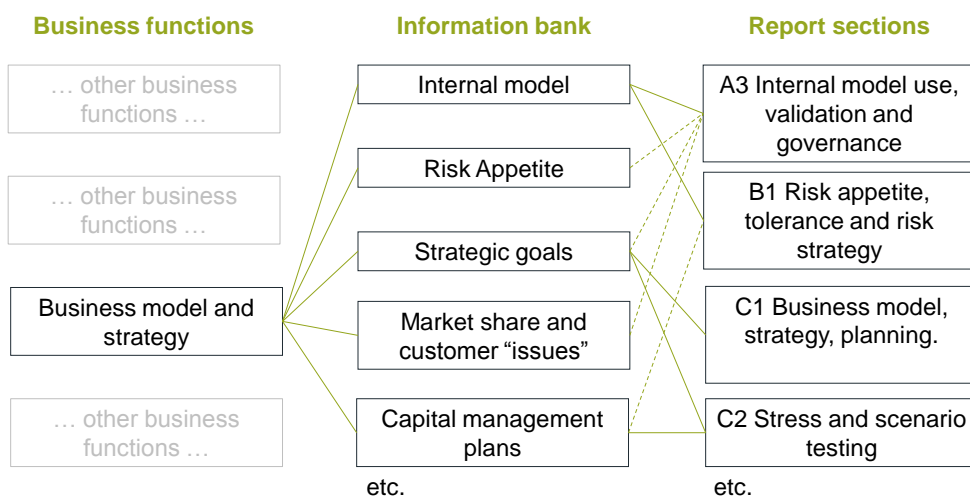
Age discrimination legislation – top-down mapping



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Age discrimination legislation – bottom-up mapping



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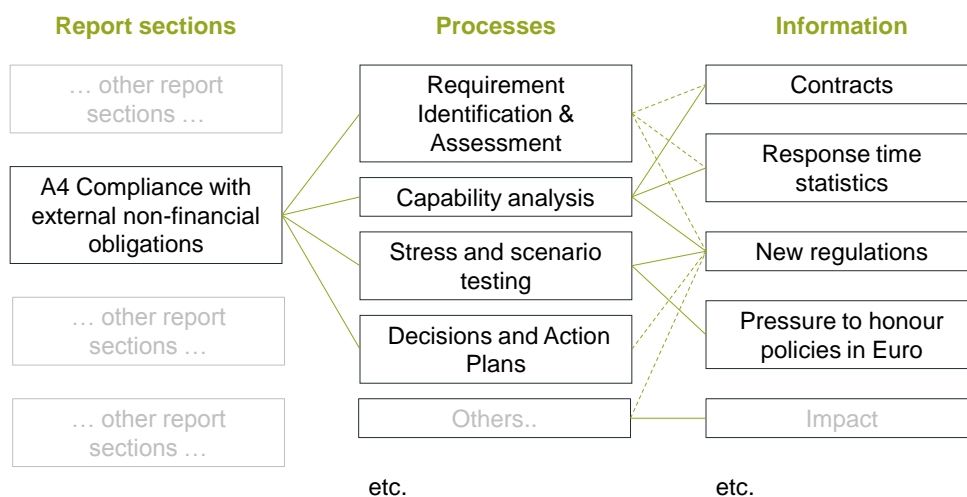
Case study 2 – a sudden event

- A sudden event – a break up of the Euro currency
 - UK based insurance company with major European branch (~50%) based in the Euro area. Business is motor and household personal lines with policies denominated in Euro.
 - Major currency uncertainty results leading to tightening of liquidity. Ten-fold increase in policyholder enquiries
 - How might the ORSA capture this event?

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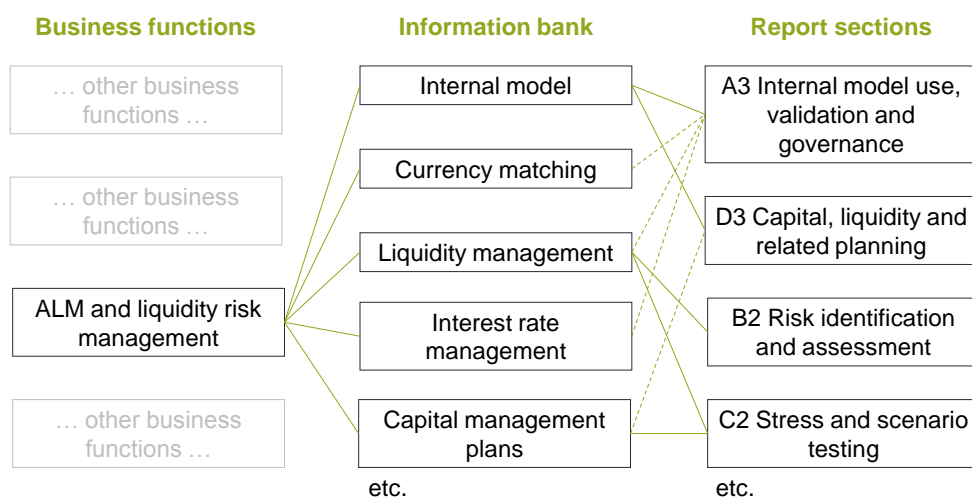
Euro break up – top-down mapping



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Euro break up – bottom-up mapping



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Other Scenario Examples

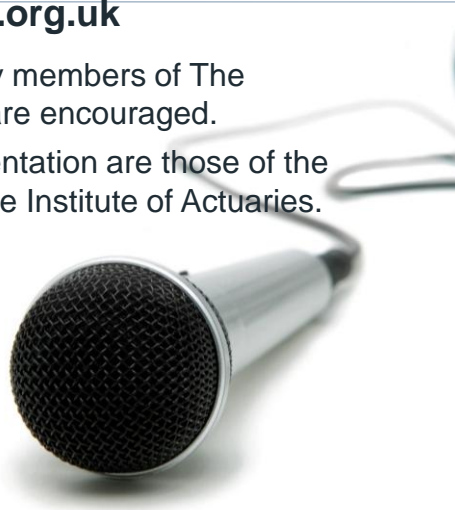
- But how about systemic risk within the insurance industry? – say a major actuarial modelling software provider (or cat risk modeler) re-states their model and this has a significant impact on required capital, as well as loss of faith in the results by senior managers?
- If that's highly unlikely then a mass lapse scenario?
- Change in practice/law/court awards to give increase in claims settled by Periodic Payment Order (PPO)
- A recently acquired portfolio or subsidiary has been found to have regulatory compliance issues e.g. in relation to "Treating Customer's Fairly" (TCF) requirements
- purchase of a new subsidiary?
- RMS release a new version of model?
- EU Directive prohibits the use of age as a rating factor for motor insurance. All member countries must comply by 1 January 2014.
- Above-normal activity and a series of small earthquakes along the California fault in early 2013 lead to fears of the "big one" occurring within the next 5 to 10 years.
- Following Greece's default, Spain and Italy are on the brink of collapse.
- The PRA and FCA come into force. The ARROW risk mitigation programme has been replaced by two separate risk mitigations programmes, one for prudential and one for conduct. Firms now have two separate sets of mitigating actions, of equal importance, to address. (This is actually what is happening.)
- Signs of a hardening market leads to a spate of reinsurer-backed startup syndicates beginning to write business aggressively at Lloyd's across a variety of classes.
- Following a series of 2012 US crop losses, our monoline competitor in the crop insurance class has gone bankrupt, leaving us with a majority share in the market for that class.
- Ogden rate reduces to a negative figure in the UK (as it already is in the Channel Islands)
- Massive European windstorm or Flood event
- More "internal" events where ORSA would be leading decision making in a firm might be:
 - A decision to takeover another insurance company
 - A decision to grow the business into a new market
 - A decision to change asset mix of a firm's investment portfolio]

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Questions or comments? Contact the ORSA working party: chris.smerald@aig.com or Dawn.McIntosh@actuaries.org.uk

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

The views expressed in this presentation are those of the presenters but not their firms or the Institute of Actuaries.



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"Bottom-up" indicative ORSA process mapping prepared by the 2012 ORSA working party

| Business Function * | Owners | Data | Example | A | | | | | B | | | | C | | | D | | | E |
|--|---|--|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 1 | 2 | 3 | 1 |
| HIGH LEVEL BUSINESS FUNCTIONS | | | | | | | | | | | | | | | | | | | |
| Vision, Mission and Strategic Direction | Board, CEO, Sr. Mgt | Mission Statement, strategic goals, board resolutions | change vision to stress profitability over market share | 1 | x | x | x | x | 1 | 2 | 3 | 4 | 1 | 2 | 3 | x | x | 3 | 1 |
| Risk Appetite, tolerance and limits | Board, CEO, Sr. Mgt | Risk Appetite Statement, Monitoring reports, breaches and exceptions | reduction to underwriting authorities | 1 | x | x | x | x | 1 | 2 | 3 | x | 1 | 2 | 3 | 1 | 2 | x | 1 |
| Corporate Governance and Social Responsibility | Board, CEO, Bus Unit Heads, Emerging Risks Committee, Business unit Heads, Emerging Risks Committee | Frameworks, Terms of Reference, Audit Reports, exceptions and Breaches, external stakeholder monitoring | Governance changes in response to new supervisory authority | 1 | 2 | 3 | x | 5 | x | 2 | 3 | x | x | x | 3 | x | x | x | x |
| Strategic Investments, Corporate Financing, Mergers | Board, CEO, Sr. Mgt, Capital Mgt. | due diligence, strategic goals, research reports, | Investment strategy change to avoid Euro crisis exposure | x | x | 3 | x | x | 1 | 2 | 3 | x | 1 | 2 | 3 | x | x | x | 1 |
| Corporate Control | Board, CEO, Sr. Mgt | project plans and tracking, OSP performance metrics | Major restructuring with an emphasis on increased and centralized controls | 1 | x | x | x | x | x | 2 | 3 | x | x | x | 3 | x | x | x | x |
| Catastrophe Modeling and Scenario Analysis | ERM, Reinsurance, actuarial, Modeling unit | model version changes, back testing results, accumulations, model results, key assumptions and uncertainties, data quality reviews | Change in cat model output | x | 2 | 3 | x | 5 | 1 | 2 | 3 | x | 1 | 2 | 3 | 1 | x | 3 | 1 |
| Capital Adequacy, Solvency and Reserves | ERM, Reinsurance, actuarial, Modeling unit | | Reserves or capital charge change | x | 2 | 3 | x | 5 | 1 | 2 | 3 | x | 1 | 2 | 3 | 1 | x | 3 | 1 |
| ALM & Liquidity Risk Management | ERM, Reinsurance, Investments, actuarial, Modeling unit | cash flow projections and stress scenarios, duration stats, capital management plans | Mismatch due to mass cancellations | x | 2 | 3 | x | 5 | 1 | 2 | 3 | x | 1 | 2 | 3 | 1 | x | 3 | 1 |
| Performance Measurement & Corporate Value Distribution | Board, CEO, Sr. Mgt | progress reports, targets, project plans, external benchmarks | change in bonus scheme | x | 2 | 3 | x | 5 | 1 | x | x | x | 1 | 2 | 3 | 1 | x | 3 | 1 |
| Investor and Analyst Relations | Board, CEO, Sr. Mgt | shareholder initiative trends, Industry topics, rating agency questionnaires, articles, ratings, performance on rating agency models (BCAR) and ratios | Pressure on S&P rating due to risk management underperformance | x | x | x | 4 | x | 1 | 2 | 2 | x | x | x | 3 | x | x | x | x |
| Peer Analysis and Benchmarking | R&D, Actuarial ERM | Industry studies, peer comparisons, ratings, | low ranking among competitors for profitability | x | x | x | x | x | 1 | x | x | x | 1 | x | 3 | 1 | x | x | x |
| Insurance Portfolio Risk Management | Actuarial, ERM, Reinsurance, capital management, board, sr management | profitability studies, accumulations, diversification stats | adverse profitability study on low capital consumptive line of business | x | x | 3 | x | x | 1 | x | 3 | 4 | 1 | 2 | 3 | x | x | 3 | 1 |

| Business Function * | Owners | Data | Example | A | | | | | B | | | | C | | | D | | | E |
|---|--|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 1 | 2 | 3 | 1 |
| Credit & Market Risk Management | Investments, reinsurance, ERM, credit officer | internal & external market value, ratings, & default stats, accumulations, scenarios | Increasing trend in credit default events detected | 1 | x | 3 | x | 5 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | x | x | 3 | 1 |
| BUSINESS AS USUAL FUNCTIONS | | | | | | | | | | | | | | | | | | | |
| Pricing models, methodologies and reference data | Underwriting, actuarial, R&D | update schedule & history, controls & testing results, exceptions, feedback | improvement to pricing model | x | x | 3 | x | x | 1 | 2 | 3 | x | x | x | 3 | x | x | x | x |
| product research and development | marketing, underwriting, actuarial, R&D | customer intelligence, new products, scenarios | new extreme weather cover | 1 | x | x | x | x | 1 | 2 | 3 | 4 | 1 | 2 | 3 | x | x | x | 1 |
| Marketing, distribution and relationship management | marketing, underwriting | market share, contact stats, hit ratios, customer "issues" | Key broker presses for new access fees | x | x | x | 4 | x | 1 | 2 | 3 | 4 | 1 | 2 | 3 | x | x | x | 1 |
| Underwriting | underwriting heads, sr mgt. | stats on business profile, production, pricing, contract terms, accumulations, customer issues, competition | restructuring of underwriting referral lines | 1 | x | x | 4 | x | 1 | 2 | 3 | x | 1 | x | 3 | x | x | x | 1 |
| Policy Processing And Operations | policy processing | premium balances & adjustments, audit reports, exceptions. | project to improve policy data capture | x | 2 | 3 | x | 5 | x | 2 | 3 | x | 1 | x | 3 | x | x | x | x |
| Claims and Benefits | claims department, underwriting | caseloads, new and pending stats, ageing, frequency and severity stats, litigation costs, coverage issues, complaints, behavioral trends, shock verdicts | centralise claim handling into the UK from individual countries | x | 2 | x | 4 | 5 | x | 2 | 3 | x | 1 | x | 3 | x | x | x | x |
| Transactional Control | cash mgt., accounting, collections, claims and policy processing | balances and aging reports, processing backlogs | centralise cash management processes | x | 2 | x | 4 | 5 | x | 2 | 3 | x | 1 | x | 3 | x | x | x | x |
| Reinsurance Transaction Management | Reinsurance procession, underwriting, claims | ratings, collateral, receivables aging, volumes against minimums and maximums, gross vs. ceded stats, exceptions, reinsurers audit results | decision to increase net | x | x | 3 | 4 | x | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 1 | 2 | 3 | 1 |
| Investment Execution & Processing | Investment department | stats relating to market liquidity and supply of various investment segments, credit spreads, processing data, exceptions and errors, defaults or late payments, pending expirations | Investments not able to be fulfilled as planned due to market dislocation | x | 2 | x | 4 | 5 | x | 2 | 3 | x | 1 | x | 3 | x | x | x | x |
| Business Continuity Management | BCP manager, sr mgt, board | BCP plans, test results, external and internal event logs, scenarios | poor performance on BCP test | x | x | x | 4 | x | x | 2 | 3 | 4 | 1 | 2 | 3 | x | x | 3 | 1 |
| Technology | IT, Operations, Business units (for needs & issues) | Business requirements, usage and demand stats, upgrade and maintenance records and plans, project management reports | delay to critical large IT project | 1 | 2 | 3 | 4 | 5 | x | 2 | 3 | 4 | x | x | 3 | x | x | x | 1 |

| Business Function * | Owners | Data | Example | A | | | | | B | | | | C | | | D | | | E |
|--|---|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 1 | 2 | 3 | 1 |
| Finance and Taxation | CFO, Tax Department, | investment statements, general ledger, tax and reporting rules | Tax inquiry in relation to intercompany reinsurance | x | x | 3 | 4 | x | 1 | 2 | 3 | x | 1 | x | 3 | 1 | 2 | 3 | x |
| Actuarial Reserving | Actuarial, Finance | reserve studies, investment statements, general ledger, tax and reporting rules | Tax inquiry in relation to intercompany reinsurance | x | x | 3 | 4 | x | 1 | 2 | 3 | x | 1 | 2 | 3 | 1 | 2 | 3 | x |
| Policy Management, Surveillance and Monitoring | Business units, compliance | training logs, | difficulty in getting OSP's to screen transactions | x | x | 3 | 4 | x | 1 | 2 | 3 | x | 1 | 2 | 3 | x | x | x | 1 |
| Recruitment and Appointment | Internal and External Audit | Audit Reports, Investigation stats | Irregularities are discovered in entertainment logs relating to key producers | x | x | x | 4 | x | 1 | 2 | 3 | x | x | 2 | 3 | x | x | x | x |
| Quality Management | Business Units, Customer Teams | complaints, social media, self tests, exception reports, process reviews | increase in customer complaints | x | x | 3 | 4 | x | 1 | 2 | 3 | x | 1 | 2 | 3 | x | x | x | 1 |
| Operational Risk Management | COO, ERM, Business Units, compliance, Internal Audit, R&D | KRI & etc., internal/external loss/risk events, audits, scenarios | instead of reporting bugs in a new system, erroneous policy transactions were processed | x | 2 | 3 | x | 5 | 1 | 2 | 3 | 4 | x | 2 | 3 | x | x | x | 1 |
| Regulatory Reporting and Liaison | Legal, Regulatory relations, Compliance, CFO, CRO, Communications | schedule against target, Warnings, new requirements, peer problems | uncertainty over ability to meet earlier filing deadlines | 1 | x | 3 | 4 | x | x | 2 | 3 | x | x | 2 | 3 | x | x | x | x |
| Legal | Legal, R&D | by type workflow stats, Emerging legislation & industry enforcements, New duties | lawsuit by women's groups over auto rates | x | x | x | 4 | x | x | 2 | 3 | x | 1 | 2 | 3 | x | x | x | x |
| Human Resources | HR, R&D | Leavings by cause, vacancy duration, social media, tenure | turnover rates amongst key staff treble | x | x | x | x | x | 1 | 2 | 3 | 4 | 1 | 2 | 3 | x | x | x | x |
| Corporate Services | Operations | space requirements and utilizaton, service stats, performance metrics | increasingly slow intranet speeds affect workflows | x | 2 | x | x | 5 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | x | x | x | x |

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A1

Process Map

Risk / General Governance and Communication

| Workstream | Process | Information Owner | Information | Example |
|-----------------------------|---|--|--|---|
| Policy & Vision | Vision Setting | Board CRO, Sr Mgt. | Govenance Vision statement, regulatory requirements, other external stakeholder requireemnts | New regulatory focus forces revisit to vision statemnt |
| | Policy | Board CRO, Sr Mgt, Complianvce | vision statement, stakeholder requirement, regulatory requirements | Change to governance policies requires new steps within key ORSA process |
| Setting business strategy | Annual strategic review | Board | Strategic review output, business plans, competitive environment | Large number of cats forced competitors into insolvency |
| Setting risk appetite | Business planning session, risk review | Board, Risk Committee | Strategic review output, business plans, competitive environment | Regulation change regarding calculation of solvency requirements |
| Identifying risks | Regular risk identification sessions | Risk Committee | Previous risk register, industry surveys, external risk review | Greek Euro exit |
| Setting capital requirement | Economic capital modelling processes | Actuarial, Claims, Reinsurance, Risk Management | All capital modelling data – premiums, claims, reinsurance etc | Greece exits Euro. Impact on assets, insurance liabilities, reinsurance claims etc. |
| Assess solvency position | Economic capital modelling processes | Actuarial, Risk Committee | All capital modelling data, regulatory adjustments | Expansion of business in Asian property cat business |
| | Stress and scenario testing | Actuarial, Risk Committee | Key model assumptions, disaster scenarios, required sensitivity tests | Mandatory testing of variables set by regulator |
| Risk reporting | Creation of risk register | Risk Committee | Risk dashboard | |
| | Risk reporting templates | Risk Committee | Company policies | Completed and fed back into process for any significant risks |
| | Regular update of register | Risk Committee, External advisors, Underwriters, Claims, HR, Brokers | Risk dashboard, external review, current news, competitive changes | Acquisition of competitor |
| Managing risks | Risk review | Risk Committee | Links to business strategy, risk appetite, external review | |
| Prepare ORSA report | Collation of reports from individual sections | Risk Committee | Capital model report, validation, Contingency plans | Annual Review, Quarterly update |
| Communication of ORSA | Internal, including Cultural Changes | Risk Committee, HR | Company policies, business strategy, links back to risk profile | Senior manager found guilty of fraudulent activity |
| | External | Board | ORSA Report | Annual Review, Quarterly update |

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A2

Data Quality

Process Map

| Workstream | Process | Information Owners | Information | Example |
|-----------------|----------------------------------|---|--|--|
| Governance | Ownership & Culture | CEO, Bus Unit Heads, ERM & compliance | training results, performance reviews | validation checks uncover poor data management culture despite extensive training |
| | Policy | CEO, Bus Unit Heads, ERM & compliance | Policy Documents, data model, monitoring & exceptions | A time deadline forces a smaller unit to delay full adherence to policy |
| | Data requirements | Head of Capital Modelling, ERM, business unit heads | data directory, Expert judgements (falsifiability), | New QRT look through category cannot be reported without crude assumptions |
| Data Processing | Internal Data Collection & Input | Sales, Underwriting, Claims, IT | Underwriting & claims data, investments, Finance areas | Project to improve policy data capture |
| | External Data Collection & Input | various data producing business units | property databases, credit stats, historic investment results, trend studies, other reference data | Identification of external data that now allows backfilling of missing broker data with impact on model accuracy and competitiveness |
| | Data adjustments | Actuarial, Finance, Risk Management, investments | deficiency and adjustment logs, | Assumptions made to convert incomplete postal code data to cresta zone |
| IT Management | Data storage and extraction | Sales, Underwriting, Claims, IT | Policy data, claims data, Transactional data | Extract process fails, resulting in 10% of claims excluded from dataset |
| | Reporting & Analysis | data owners, IT, others | various internal reports and query databases, emerging requirements | Data warehouse implemented, but contains pitfall of blank records for legacy data |
| Assurance | Assessment | data owners, chief data officer | validation exercises, detective reports, issues logs, databases, source material | Discovery that legacy data had fields that were missed in the remapped exercise with result that some historic claim expenses were in the wrong currency |
| | Data shortfall mitigation | Actuarial, Finance, Risk Management | Expert judgement logs, exception reporting, "uplift" factors (for deficiencies) | Workaround required for gaps and duration of internal operational loss event reporting |
| | Audit and testing | data owners, internal audit, external audit | detective reports, audit results | Audit finds that coding accuracy has declined in light of more ambitious data requirements |
| MI & Analysis | Analysis | Actuarial, Finance, Risk Management | Experience analysis, rating factor assessment, claims trends analysis, etc. | Spreadsheet contains formula errors, invalidating results of analysis |

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A3

Process Map

ORSA Capital Calculation Methodology

| Workstream | Process | Information Owner | Information | Example |
|--------------|---|--|--|--|
| Model design | Risk Exposure Analysis and Ranking | ERM, Actuarial, Investments, Finance, business unit heads | risk profiling results, surveys | Change in risk ranking due to new structural drivers |
| | Goal setting and design | Board, Sr. Mgt, business unit heads, capital modelers | Design workshops, discussions with management | design is simplified as investments in derivatives are reduced |
| | Modifications and deviations for ORSA use | ERM, Actuarial, Investments, Finance, business unit heads | ORSA strategy, 1 year compliant internal SCR, standard formula | Ultimate basis rather than one year view is chosen for ORSA run revision |
| | Model development and maintenance | ERM, actuarial, capital modelers | technical work products, model change requests, prioritizations | Change in correlation methodologies within insurance risk |
| | Identification of design limitations and conservative adjustments | ERM, actuarial, capital modelers | design tradeoffs discussed, data analysis, back testing, scenarios | "uplift" chosen for nat cat data gaps |
| Modeling | Data capture and Analysis | Actuarial, Finance, ERM, investments, individual data owners | information in data warehouse, expert judgments, external data | new more granular data found to be credible now used for credit risk review |
| | Calibration & Validation | Capital modelers, Actuarial, Finance, ERM, Investments | Parameterization data, outliers analysis, test runs, benchmarks | SCR benchmark detail updated by regulator |
| | Output & Use | Capital modelers, ERM, Business unit heads, board | input/output parameters, Simulation results, decision documents | New use added |
| | Back testing | Capital modelers, ERM, Business unit heads | Simulations, reference data, experience | Back testing finds that model fits well 10 year variability, but weaker for 25 year horizon on proxy dataset |
| Governance | Documentation and change Management | Modelers, ERM, compliance, audit | change requests, meeting minutes, programming documentation | List of critical model changes needed and whether these represent a new IM regulatory application |
| | mapping and validation against SCR requirements | ERM, Actuarial | Internal Model regulatory requirements, standard formula, model features and parameters, sample data | Mapping finds a very large deviation to standard formula in an area of high data uncertainty |
| | Data quality | Actuarial, Finance, ERM, investments, individual data owners | data quality exceptions (as discussed in A2, but IM focused) | data quality found to be strong, leading towards increased comfort in the Internal model output |
| | Communication and business ownership | ERM, Sr. Mgt., business unit heads | significant model features, proposals, challenges received and their resolution | Reinsurance department likes the individual counterparty functionality and suggests fine-tuning to better inform treaty negotiations |

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A4

Process Map

Compliance With General Obligations

| Workstream | Process Examples | Information owner | Information | Example |
|---|--|---|--|---|
| Identification & Assessment | Contractual duties identification & assessment (e.g., service commitments implied or specified by policy) | Compliance, Legal, and Underwriting. | Contracts, Fulfillment statistics, TCF data, complaints, etc. | Rapid growth in the sale of claim services |
| | Other indirectly contracted duties identification & assessment | Compliance, Legal, & Marketing | marketing materials, outsourcing agreements, response times, reservations of rights, complaints. | New advertising campaign that stresses the firms focus on quality |
| | Externally imposed duties identification & assessment | ERM, Compliance, Legal, Marketing, Underwriting. | Regulatory requirements, regulatory briefings, & enforcement actions, shareholder and public activism trends | Regulator imposes that the company have a living will |
| Capability analysis and Recommendations | Comparison of fulfillment data against requirements | ERM, Compliance, Legal, Marketing, Underwriting. | in force number of commitments by service type, information on OSP's providing services, regulatory briefings + experience | sub industry performance identified against contract certainty |
| | Stress and scenario analysis of fulfillment obligations (bespoke for this section and implications from other more general ORSA scenarios) | ERM, Compliance, Legal, Marketing, Underwriting. | Information from above, other ORSA stresses and scenarios, experience | Scenario finds significant publicity risk that could imperil major new strategic push |
| | Recommendations | ERM, Compliance, Legal, Marketing, Underwriting. | As above | Recommendation that further data gathering be commissioned to allow complete analysis |
| Governance | Decisions and action plans | Board, Sr. Mgt, business unit heads, ERM, compliance, Legal | Hiring Stats, Exit Stats, general complaints | New action plan in response to heightened risk to business model. |
| | Monitoring and assurance | Compliance, Internal Audit | As above | Issue spotted with following spirit of TCF requirements |

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A5
ORSA Assurance

Process Map

| Workstream | Process | Information Owners | Information | Example |
|---|---|---|---|--|
| ORSA Information and issue Gathering | Board and Sr. Management Strategy and Planning ("top down") | Board, CEO, Bus Unit Heads, ERM | Permanent Issues logs, New Issues log, scenarios, board agendas | positive: a review of key ORSA referrals and non-referrals, shows a good referral process |
| | Internal and External Risk, Capital and Other Requirements ("Top Down") | Board Sr Mgt., ERM, Actuarial, Investments, Compliance | | |
| | Internal issues & data gathering ("bottom up") | ERM, business units | Internal Risk event logs filtered for ORSA relevance, ad hoc strategic and planning situations (filtered for relevance) | negative, no investment identified issues despite a volatile Euro |
| | External issues & data gathering ("bottom up") | ERM, business units, emerging risks committee, consultants | External Risk event logs filtered for ORSA relevance, ad hoc industry and customer strategic and planning situations (filtered for relevance) | Positive, a comparison of top 10 risks from a well regarded chief risk officer publication |
| ORSA Collaboration and Analysis | Calculation & analytic processes | ERM, actuarial, capital management, Investments, business Unit Heads | Output of analyses | positive,: analysis relied on for ORSA was well reasoned and documented and included different parts of the business |
| | Collaborating and feedback | Board, CEO, Bus Unit Heads, ERM, actuarial, capital management, Investments | diaries, minutes or other records of discussions, revision histories | negative: investment impact scenario solely performed for internal analysis with no discussion with investment function |
| Governance, Decision-making & Documentation | Ownership & Culture Validation | Board, CEO, Bus Unit Heads, ERM & compliance | participation results, performance reviews | negative: stale issues reporting indicates lack of participation by key business function |
| | Policy Validation | Board, CEO, Bus Unit Heads, ERM & compliance | Policy Documents, ORSA policy, monitoring & exceptions | Positive: board committee "self audit" analysis of exceptions (things not run through ORSA) identifies business model area that would benefit from more structured risk informed management analysis |
| | ORSA Based Decision-making | Board, CEO, Bus Unit Heads, ERM | Decisions taken as result of ORSA process | negative: significant new product decision made before ORSA input received |
| | Successes & Exceptions | Board, CEO, Bus Unit Heads, ERM | Impact of decisions tracked over a reasonable length of time, exceptions monitoring (e.g. no decision reached) | positive: important decisions not run through ORSA have written documentation why and a plan to follow-up with tracking and ORSA process improvements |
| Audit | Internal or external audit | compliance, internal audit, external audit | detective reports, audit results | positive: Audit finds that the ORSA process is excellent, but sees ways for increased synergy |
| | Action point monitoring | data owners, internal audit, external audit | issues logs | positive: Synergy recommendations are planned, and monitored |

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B1

Process Map

Risk Identification and Assessment (Incl. Ranking)

| Workstream | Process | Example owners | Information | Example |
|---------------------------|------------------------------------|------------------------------------|--|---|
| Risk Capacity | Capital Management | Treasurer/Cap Mgt. | Assets, Liabilities, Contingencies | Loss of investment value reduces capital to a point where it is likely to be breached |
| | Regulatory relations | Compliance Officer | compliance monitoring | failure to comply fully with anti money laundering leads to risk of license suspension |
| | Financial reporting | CFO | audit results, progress on systems to meet new requirements | transformation project fails to produce required regulatory information on time |
| | | | | |
| Risk Appetite & Tolerance | Risk appetite setting & monitoring | Board, Management, ERM | Earnings criteria, return on capital, capital at risk for various time horizons, measurable acceptable variation | Parent chooses a lower target on the risk reward frontier and declare they want no more than 5% chance of a loss in a given year. |
| | | | | |
| Risk Limits / targets | underwriting limits management | Underwriting, ERM | dashboards, exception items, emerging risk data | New RMS model released |
| | Investment limits management | Investment, ERM | dashboards, exception items, emerging risk data | External Economic event |
| | compliance monitoring | Compliance Officer, internal audit | reports, news | serious reportable event |
| | | | | |

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B2

Process Map

Risk Appetite, Tolerance & Risk Strategy

| Workstream | Process | Information owner | Information | Example |
|---------------------|---|---|---|---------|
| Business Analysis | Evaluate Business Objectives Strategy & Organization (business model) | Board, Sr. Management | Mission, strategy, planning, organogram doc's, business model. | |
| | Business process & Controls review | sr mgt., business heads, internal audit, compliance dept. | process map, procedure guides, control assessments, internal audit reports | |
| | Financials Review | Finance, actuarial, investments, ERM | P&L reports, financial statements, reserve studies, accumulation statistics, investment statements, general ledger forecasts | |
| | Operating Environment review | ERM, business heads | Industry analyses, analyst and consultant materials | |
| Goal Setting | Establish identification/assessment process (itself) goals | Board or Sr mgt. | Discussions with management, regulatory and rating agency requirements | |
| Risk Identification | Strategic Risk identification | Board, Sr. Mgt, ERM | List of new initiatives, progress reports, R&D on trends and changes, Scenarios, experience of participants E.g., A decision to centralize operations should trigger a holistic review of risks | |
| | Financial Risks (Insurance, credit, market, & etc.) | Finance, actuarial, investments, ERM | past deviations from plan within financial info, R&D, scenarios, experience of participants | |
| | Operational Risks | ERM, compliance, senior staff | External taxonomies of risk, loss and risk event logs (internal and external), scenarios, experience of participants | |
| | External Operating Environment | Board, Sr. Mgt, ERM | External loss and risk event logs, studies, scenarios, business model and experience | |
| Risk Assessment | Analysis and description of risk | ERM, sr staff, compliance, internal audit | Experience and the above inputs | |
| | Qualitative assessment | ERM, sr staff, compliance, internal audit | Experience, external and internal benchmarks, statistical modeling | |
| | Quantitive Assessment | Actuarial, investments, other risk taking staff, ERM | Experience and all the above inputs | |
| | Set appetite/tolerance (granular bottom up) | Sr. management, business area heads | Experience and all the above inputs | |
| | Management e.g., ownership, reporting and mitigation (other than capital) | Sr. management, business area heads | Experience and all the above inputs | |
| | Uncertainties and limitations Disclosure | ERM, other important content producers | Experience and all the above inputs | |

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B3

Process Map

Risk Profile Monitoring

| Workstream | Process | Information owner | Information | Example |
|--------------------------------|---|--------------------------------------|---|--|
| Risk profile at reporting date | Assessment of risk profile against risk appetite/risk tolerance | Risk Committee | Risk register, Stress and scenario testing | Comparison of individual risks with risk limits; including analysis at different percentiles |
| | Monitoring of accumulations (by risk type) | Risk Committee, Actuarial | Exposure by geography / asset type / reinsurer etc | Cat accumulations; Exposure to particular asset classes |
| | Benchmarking | Risk Committee | External data or industry statistics | ORIC (ABI Operational Risk database) |
| | Monitoring of risk profile against capital requirement assumptions (internal model) | Risk Committee, Actuarial | Model validation report, Internal model assumptions | Changing assumptions or methodology following review of experience |
| | Monitoring of risk profile against capital requirement assumptions (standard formula) | Risk Committee, Actuarial | Assumptions underlying the standard formula calculation | Challenging the use of standard formula if not appropriate for risk profile |
| | Use of risk register in assessing risk profile | Risk Committee | High level risk register | Change in reinsurance arrangements following review of risk profile |
| Work stream | Process | Information owner | Information | Example |
| Ongoing risk monitoring | Assessment of emerging risks | Risk Management committee | Legislative changes, court awards, claims statistics, exposure monitoring | Monitoring of risk register over time (possibly including phylogenetic analysis) |
| | Monitoring of Key Risk Indicators | Risk Committees | Claims frequency, Interest rates, credit ratings | Review of investment portfolio based on economic conditions |
| | Monitoring of Key Performance Indicators | Board or Management Committee | Profit, solvency, employee morale, market position | Review risk profile in light of reduced profitability |
| | Monitoring by Risk Type | Subject Matter Experts | Detailed review by relevant risk SMEs | Change in product offering based on strategic risk considerations |
| | Projection of risk profile over the business planning period | Risk Committee / Actuarial / Finance | Business plan and strategy | Management actions to support planned future changes in asset portfolio or business mix |
| Governance | MI and committee structure | Board | Enterprise Risk Framework, Risk dashboard | MI reports |
| | Validation and audit | Audit Committee | Audit reports, validation reports (e.g.- internal model) | Review of effectiveness of risk profile monitoring |
| | Escalation process | Risk Committee | Defined escalation paths and thresholds in risk policies | Automatic escalation when risk limit or appetite likely to be breached |
| Reporting | Internal reporting | Risk Committee/ Management Committee | Consolidation of above information for management | Risk profile against risk appetite MI, KRIs, KPIs |
| | ORSA report | Board | Consolidation of above reports, together with conclusions | ORSA report following change in risk profile (e.g.- merger or acquisition) |
| | Report to supervisor (RTS) | Board | Required regulatory information regarding risk profile | Exposure information by line of business |

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C1

Business Strategy

| Workstream | Process | Example owners | Sample Information | Example |
|--------------------|--------------------------------|---|--|---|
| Strategic Vision | Mission and vision setting | Board, Sr. Mgt, CRO | Mission and vision statement, governance vision, high level competitive outlook, High level risk appetite statement | Societal expectations force a rethink of corporate values and mission |
| | Success criteria & monitoring | Board, Sr. Mgt., ERM | High level targets and assumptions, risk appetite and other monitoring metrics, summary of business model successes & failures | Tracking of business performance against assumed shareholder expectations |
| | Feedback and action points | Board, Sr. Mgt., ERM | monitoring data, experience, external input | Competitor makes a strategic investment in parts of the value chain that your firm does not participate in. |
| Business Model Mgt | Articulation of Business model | Board, Sr. Mgt, CRO | Business model document/system | Detailed model for direct marketing insurance segment |
| | Strategic plans | Board, Sr. Mgt, CRO | Strategic vision, current business model, experience, governance documents, external input | Cascaded strategic plan to reduce carbon footprint of firm and customers. |
| | Governance Plans | Board, Sr. Mgt, compliance officer, CRO | procedure guides, terms of reference, other governance documents | Change in how customer relationships will be governed to accommodate new legislation |
| | Business Plans | Sr. Mgt, Department Heads, ERM | strategic plans, risk appetite statement | Normal business planning documents expanded to consider key partners |
| | View of External Environment | Sr. Mgt, Department Heads, ERM | Emerging risk committee, R&D, business unit heads, experience, external input | Insurance cycle forecasts |
| | Success Criteria & monitoring | Sr. Mgt, Department Heads, ERM, Staff | success thresholds & milestones, performance data, external data | measure against budget or targeted market share. |
| | Feedback and action points | Sr. Mgt, Department Heads, ERM | monitoring data, experience, external input | softening of rates causes rethink of what niches will be targeted |

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C2

Process Map

Stress and Scenario Testing

| Workstream | Process | Information Owner | Information | Example |
|-----------------------------------|---|---|---|---|
| Initial baseline | Economic capital modeling process | Actuarial, Claims, Reinsurance, Risk Management | All capital modeling data – premiums, claims, reinsurance etc | |
| Assumptions and sensitivity tests | Setting of initial assumptions | Actuarial, Risk Committee, Claims, Reinsurance | Initial parameters used for economic capital modeling process | Claim parameters, reinsurance structure, economic factors, dependencies |
| | Identification of sensitive assumptions | Actuarial, Risk Committee | Probably an iterative approach, involving at least one sensitivity test for each key assumption | Test impact of moving expected future inflation by +/- 0.5% |
| | Setting range of parameters for key assumptions | Actuarial | Historical range of data for parameters being tested; potential future developments internally or externally; Links with IT around capacity of infrastructure | Shift in yield curves due to breakup of Euro |
| | Business input to sensitivity test | Underwriting, Claims, Reinsurance, Risk Management, Actuarial | Likely future scenarios, consideration of next year's business plan, adjustments for shift in marketplace | Property cat rate increases in Asia due to recent earthquakes |
| Scenario tests | Identification of scenarios | Actuarial, Risk Committee | Overview of the business and likely interaction | Impact of expansion into a new line of business on investment income |
| | Consideration of other scenarios | External advisors, regulators | Independent view of business, standard scenarios across the industry | Lloyd's Realistic Disaster Scenarios |
| | Holistic scenarios | Risk committee, Actuarial, External advisors, Regulators | Impact on people, processes and seemingly unrelated parts of the business | Need for increased resources to deal with regulatory requirements |
| Reverse Stress Testing | Fitting of historical results to current model | Actuarial, Risk Committee | Historical data, claims, reinsurance, investment returns, economic factors, business volumes | Impact of moving to current reinsurance programme |
| Validation of results | Review each stress and scenario run | Actuarial, Risk Committee | Expected results vs. actual model output | Production of risk reports and output packs for each run |

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E1

Assessment And Tracking of ORSA Action Items & Residual Issues

| Workstream | Process | Information owner | Information | Examples |
|----------------|--|--|--|---|
| Implementation | Plan establishment and monitoring | Project Management Office, Risk Management, Actuarial | Implementation plans of actions recommended by the board, progress against targets | Resources available, project timelines, hardware and software requirements, external assistance |
| | Reinsurance Purchase | Reinsurance committee, Underwriting | Availability of reinsurance in marketplace; reinsurer's appetite for risk | Can the market supply the \$500m of PI reinsurance required for a specific high-risk sector? |
| | Reputational establishment | Board, Marketing | Perception in marketplace; ability to win new business or maintain existing business relationships | Likelihood of customers bringing business to the company |
| | Resourcing | HR | Ability to recruit appropriate staff to carry out plans and manage the business | Lack of actuaries with experience of Solvency II |
| | Legal contracting | Legal, Underwriting | Case law, Wordings review | Ability to execute wording improvement affected by impact on current coverage actions |
| Assessment | Communication Effectiveness | Data, Underwriting, Actuarial, Risk Management, Claims, Finance, Reserving | Ability to collect, assess and disseminate information accurately and in a timely manner | Adjustments to exposure following pricing table restructure; information not being passed back appropriately to reinsurance team from brokers |
| | Assessment of plan feasibility and appropriateness | Project Management Office, Risk Management, Affected business functions | Milestone tracking, issues logs, tracking of progenitor issues | Plan hits practical blocks to timely completion. |
| | Evaluation of reinsurance program | Reinsurance committee, Actuarial, Risk Management | Potential basis risk between reinsurance modeled and reinsurance purchased in the market | Reinsurance contract information (Premiums, Limits, attachments), Capital Model output |
| | Reinsurance Recoveries | Reinsurance committee, Underwriting, Actuarial | Evaluation of Outwards reinsurers; Reinsurer financials, credit rating reports, existing exposures , collateral agreements | Downgrade of reinsurers increasing exposure unexpectedly to reinsurer credit risk |
| | Underlying and Residual issues | ERM, various involved business owners | Original issue monitoring reports, risk analysis of mitigation plans choses, plan monitoting reports, associated issues tracking (even if nothing planned for these) | Underlying issue has improved and expensive remediation action may no longer be needed |