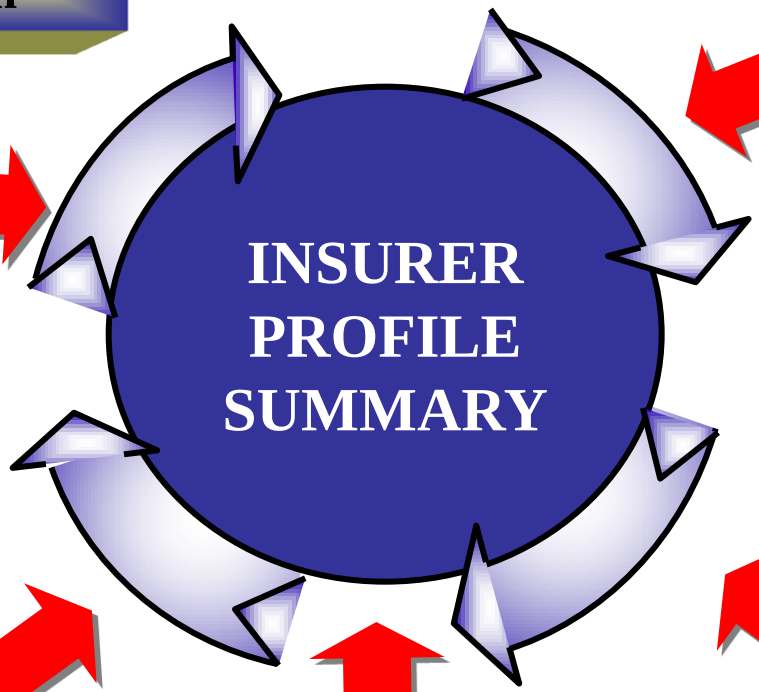
ADB – Emerging Economies – Insurance Sector Supervision

Risk Based Supervisory Framework



Supervisory Plan

Develop Ongoing Supervision That Includes:
- Frequency of Inspections
- Scope of Inspections
- Meetings with Management
- Follow-Up on Recommendations
- Financial Analysis Monitoring
- Post Inspection Reporting

Inspection

- Risk Based Inspection
- Full-Scope or Targeted?
- Identify Functional Activities
- Identify/Assess Inherent Risk
- Identify & Evaluate Controls
- Determine Residual Risk
- Establish Procedures and Conduct Inspection
- Update Supervisory Plan
- Inspection Report//Mgmt Letter

Priority System

Priority System Based on Supervisor's financial analysis tools:
- Scoring System
- Stress Testing
- Early Warning Template

Off-Site Macroprudential Surveillance

Financial Analysis includes:
- Risk Assessment Results
- Risk Based Supervision Manual
- Ratio Analysis
- Actuarial Analysis
- Update with internal/external changes

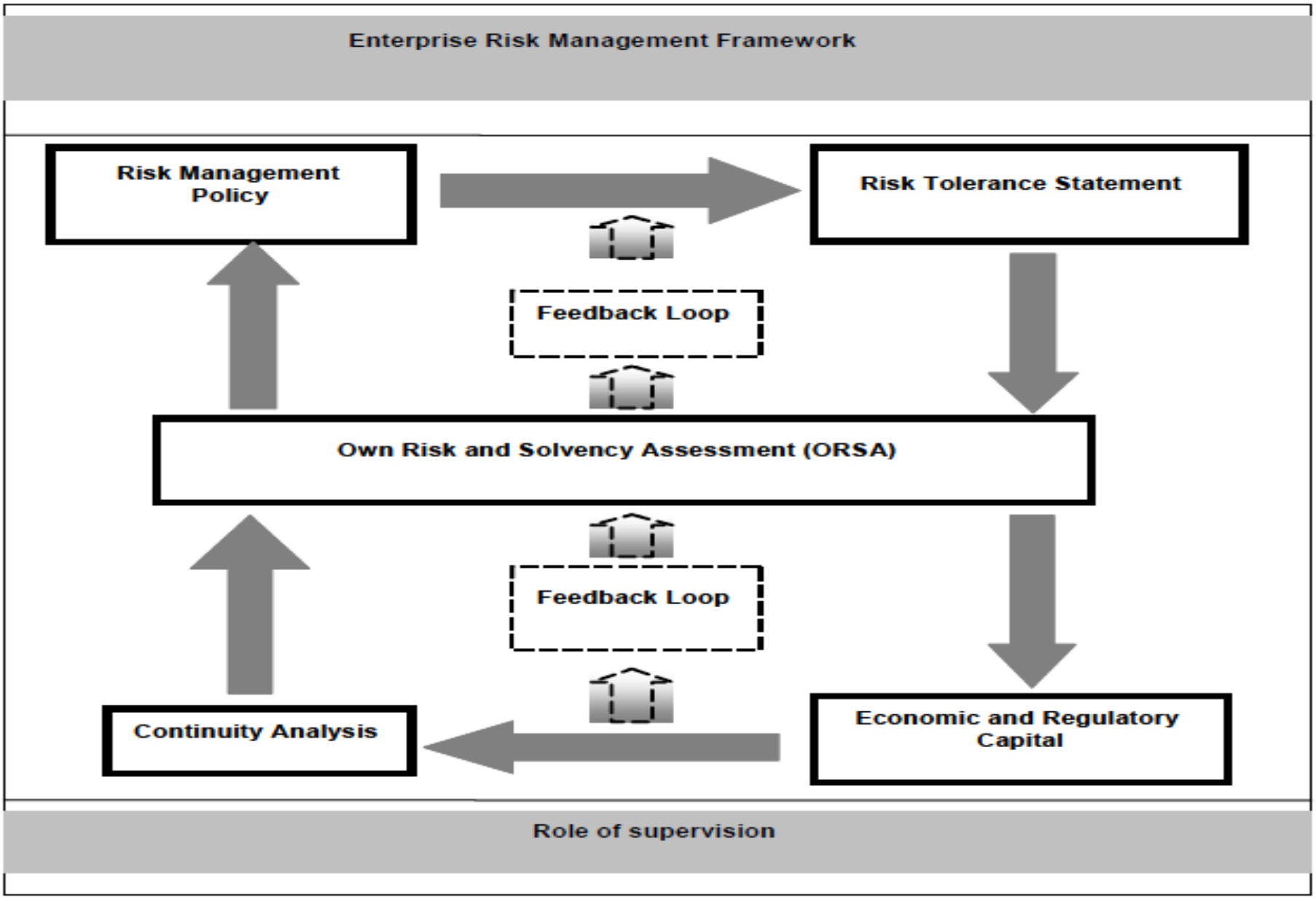
Internal/External Changes

Consider Changes to:
- Financial Strength Ratings
- Ownership/Management/ Corporate Structure
- Business Strategy/Plan
- Auditor
- Legal or Regulatory Status

Supervisory Modernization Framework

RBC/IT	Current models in emerging markets not sufficuently integrated with the analysis or on-site inspection framework. Models are not dynamic or based on insurance risks specific to the insurance sector. Need for specific calibration to market data depending on reliability (e.g. various reserving requirements based on accounting standards). Manual processes burdensome and inefficient in relation to resources.
ALM/Legal/Stress Testing/ERM	ALM framework in emerging markets are typically rules-based. Wide variation of competencies in market. Stress testing - complexities. Reconciliation issues with RBC and business plans, high FTE absorption. Doubts over reliability of companies, reconciliation and enforcement issues.
Operational Risk and Group Supervision	Assessment of groups currently being developed in many jurisdictions. Thus, need for attempt to capture operational and group risk. Need to include operational and concentration risk with addition of diversification benefit (coefficient of variation), in order to not penalize certain corporate structures.
Early Warning System	Ratios are typically somewhat static and not dynamic in terms of the local market conditions. Various reporting and analysis reports that are not coordinated internally within the supervisory. There often should be more granularity with regard to the supervisory ladder of intervention.
Risk-Focused Inspections	No comprehensive documentation repository usually exists for inspections. Risk factors heavily reliant on inspector's judgment without process to determine moderate or high risks. Little or no integration on risk assessment through early warning systems or stress testing. IT or fraud examination processes?

ICP 16: Enterprise risk management for solvency purpose



Insurance Risk:	**Counterparty Credit Risk**
Gross Premium/Shareholder Funds	Retention Ratio
Net Premium/Shareholder Funds	Outstanding Premiums/Total Premiums
Incurred Loss Ratio	Aging Analysis of Reinsurance Recoverables to Net Assets
(Commission + Management Expense)/Net Earned Premiums	Bad Debt/Total Receivables
Combined Ratio	(Total Loans + Corporate Bonds +Debentures)/Total Assets
Change in Capital and Surplus	Gross Risk Ratio – Net Risk Ratio
Change in Net Underwriting	
Change in Gross Underwriting	**Liquidity Risk**
Equity to Liabilities	Claims Paid/Liquid Assets
Return on Equity	Technical Provisions/Liquid Assets
Loss Reserve Ratio	Current Liabilities/Total Assets
Technical Reserves Cover	Liquid Assets/Total Liabilities
Insurance Debt Ratio	Current Liabilities/Total Reserves
Solvency ratio	(Liquid Assets – Current Liabilities)/Total Assets
Operational Risk:	**Market Risk**
Computer Equipment/Total Assets	Investment Equity/Total Assets
Loss Reserves/Total Claims	Tradable Assets/Total Assets
IT Cost/Total Expenses	Technical Reserves/Equity
	Equity Investment Risk Ratio
Strategic Risk	Investment Asset Ratio
HHI by Line of Business	(Investments in Properties + Lands & Buildings)/Total Assets
Dividends/Profits	
	Contagion Risk
Legal Risk	Investment in subsidiary/Total assets
Claim Reserves/Total Claims	Related Party Analysis Ratio

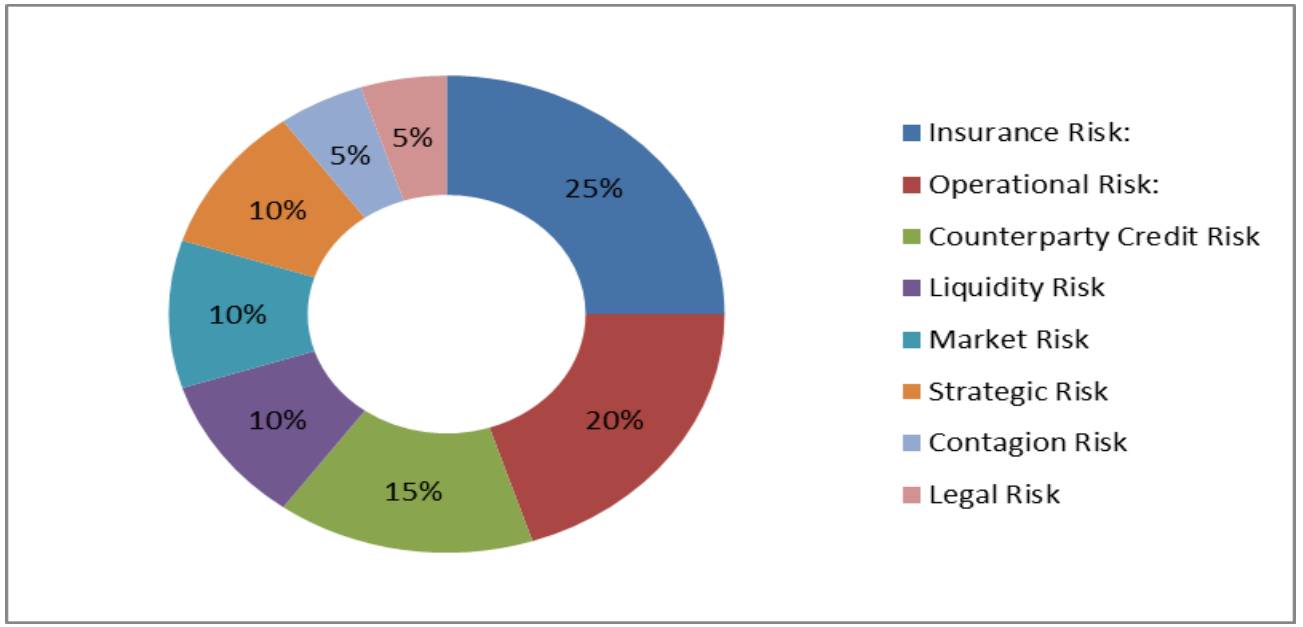
Correlation Analysis to Drop Redundant Ratios

	Insurance Risk	
	Gross Premium/Shareholder Funds	Net Premium/Shareholder Funds
Gross Premium/Shareholder Funds	1.00	0.99
Net Premium/Shareholder Funds	0.99	1.00
Gross Risk Ratio – Net Risk Ratio	0.41	0.33
Technical Reserves/Equity	-0.03	-0.01
Incurred Loss Ratio	0.02	-0.01

The different grades were based on an objective analysis of financial ratios *i* to company *j* in period *t*. In the first stage, the average and the standard deviation indicators were calculated for every financial ratio, and outlier observations falling within the tail-end of the distribution (below 1% and 99%) were dropped from the data due to problems associated with some of the ratios that were affected by the data quality. In the next stage, each ratio was divided into five homogeneous clusters, each of which received a grade from 1 to 5. The clusters were arranged in descending order for financial ratio correlated positively with the financial stability of the insurance company (grade 5 was given to a cluster with high-value center, grade 1 was given to a low-value center), and in ascending order for financial ratios correlating negatively. Some exceptional ratios ("distribution") were divided to six clusters, with both upper and lower bounds are correlated negatively with the insurance stability.

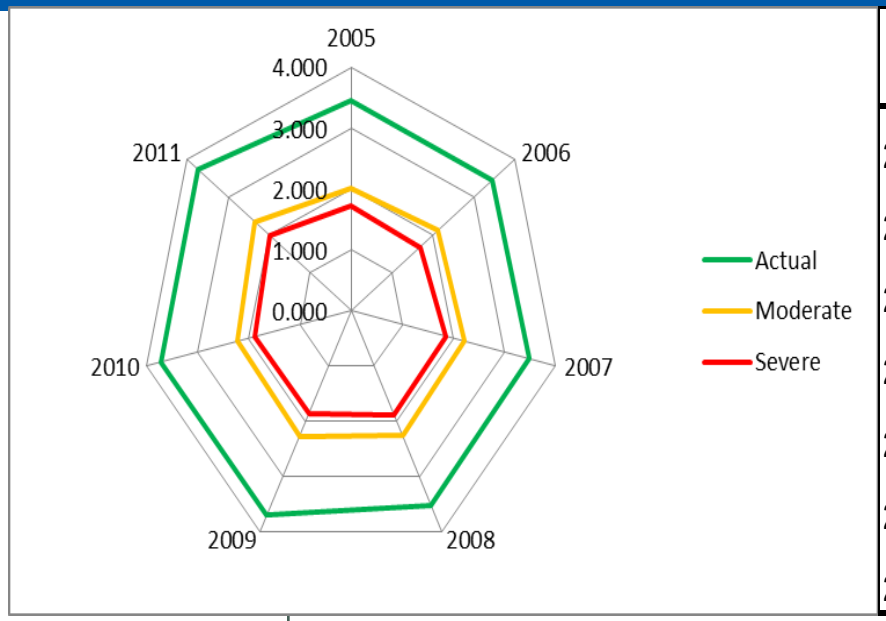
Positive	5	4	3	2	1	
Negative	1	2	3	4	5	
Distribution	1	2	3	4	5	1

Assign Risk Weights



CALCULATION OF STRESS ON SELECTED RATIOS

		Baseline				
		Combined Ratio	Technical Reserves Cover	Insurance Debt Ratio	Current Liabilities/Total Reserves	Investment Equity/Total Assets
	MIN	-1.036	0.000	0.000	0.003	0.000
	MAX	4.587	4.239	16.465	2.152	0.594
	AVG	0.982	1.085	0.916	0.231	0.107
	STD	0.304	0.602	1.232	0.263	0.128
	MEDIAN	0.971	0.980	0.636	0.142	0.057
Severe	UPPER BOUND(99%)	1.542	3.306	3.509	1.256	0.504
Moderate	UPPER BOUND(90%)	1.107	1.715	1.862	0.481	0.308
	QUARTILE 99%	1.542	0.333	3.511	1.260	0.504
	KURTOSIS	84.973	3.307	99.959	15.024	2.244
	No of STD	5	5	3	21	37
	No of STD	4	3	2	8	22



	Overall Grade		
	Actual	Moderate	Severe
2005	3.447	2.016	1.715
2006	3.453	2.124	1.682
2007	3.481	2.219	1.861
2008	3.530	2.265	1.879
2009	3.713	2.271	1.858
2010	3.729	2.215	1.876
2011	3.727	2.337	1.970

MODERATE SHOCK								
Year/Risk	Insurance Risk	Operational Risk	Counterparty Credit Risk	Liquidity Risk	Market Risk	Strategic Risk	Contagion Risk	Legal Risk
2005	2.26	1.50	2.48	1.51	1.78	2.79	2.82	1.00
2006	2.20	1.50	2.50	1.50	1.66	3.04	3.59	1.00
2007	2.39	1.50	2.54	1.59	1.69	3.01	4.03	1.00
2008	2.42	1.50	2.53	1.61	1.70	3.01	4.33	1.00
2009	2.52	1.50	2.40	1.60	1.59	3.00	4.56	1.00
2010	2.49	1.50	2.39	1.57	1.73	2.91	4.14	1.00
2011	2.61	1.55	2.49	1.68	1.72	2.96	4.68	1.00

SEVERE SHOCK								
Year/Risk	Insurance Risk	Operational Risk	Counterparty Credit Risk	Liquidity Risk	Market Risk	Strategic Risk	Contagion Risk	Legal Risk
2005	1.97	1.50	2.21	1.25	1.54	2.23	2.03	1.00
2006	1.84	1.50	2.22	1.23	1.44	2.55	1.65	1.03
2007	1.96	1.50	2.39	1.32	1.48	2.80	2.41	1.03
2008	1.91	1.50	2.41	1.43	1.44	2.90	2.44	1.00
2009	2.07	1.50	2.26	1.47	1.40	2.94	2.22	1.00
2010	1.98	1.50	2.24	1.43	1.55	2.69	2.62	1.00
2011	2.08	1.50	2.36	1.57	1.50	2.91	2.84	1.00

Data Quality

Data

- **All information needed** to carry out a valuation of technical provisions
- **Assumptions** are **not regarded as data**, although the use of data is an important basis to develop actuarial assumptions

Criteria to assess data quality

- **Appropriateness**: suitable for the intended purpose and relevant to the portfolio of risks being analysed?
- **Completeness**: Recognition of all of the main homogeneous risk groups? Sufficient historical information?
- **Accuracy**: free from material mistakes, errors and omissions (e.g. due to human error or IT failures)? Adequate recording, timely and consistent over time?

Data deficiencies

- E.g. due to changes in legal environment
- **Adjustments** could be made to the data, based on or complemented with expert opinion. Those should be justified and documented and not overwrite the raw data.
- **Approximations** could be used to calculate the technical provisions
- In no case the use of approximations should be seen as an alternative to implementing appropriate systems and processes for collecting material relevant information and building historical databases.

Data Quality

Requirements on internal processes

- Undertakings should have **data quality management** processes in place
- **Internal processes** on identification, collection, and processing of data
- **Auditors** should audit specific sets of data and the **actuarial function** will review the quality of data

Data Quality management: continuous process

- Detailed **definition and description** of the items to be collected
- **Assessment** of the **quality** of the data i.e. verification of the data quality criteria appropriateness, completeness and accuracy
- **Resolution of material problems** identified
- Periodically **monitored** (e.g. data quality indicators although expert judgment needs to play a key role)

Data Quality

Risks due to Low Data Quality are Plenty....

Common myths

- We do not have data quality issues
- Informal data change control processes work
- It is responsible for our data so we let them handle it
- We have so many compliance programs in place we must therefore be governing data

Consequences of poor data quality

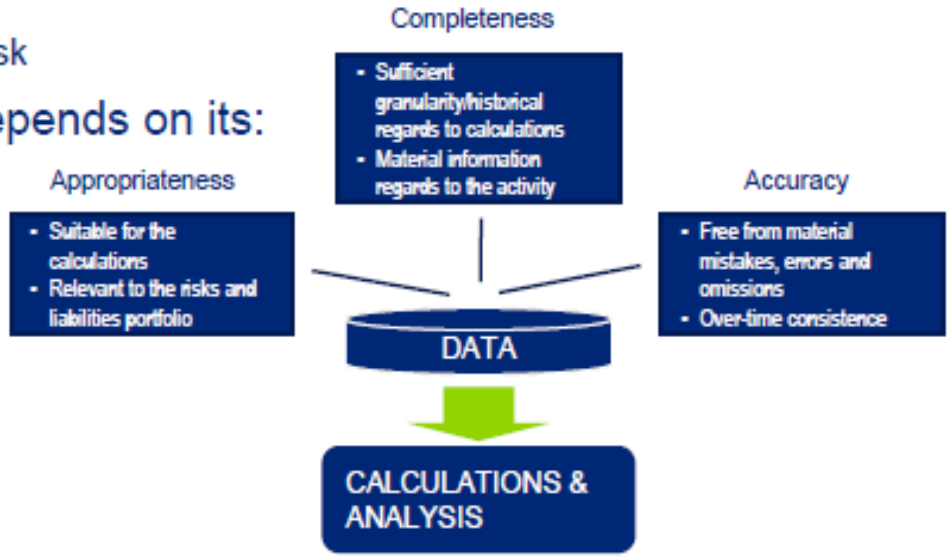
- Incorrect results from calculation TP, MCR and SCR
- Unreliable internal and external reporting (reputational risk)
- Wrong assumptions when developing internal models
- Negative effect on management and decision taking based upon the model results
- Wrong pricing when using internal model calculations in pricing tools
- Limited drill-down possibilities when analyzing risk calculations
- Capital add-on as a consequence of insufficient data quality:
  Or forced to apply the standard formula approach

Common problems

- Strategy for data governance has not been a priority or focus, resulting in unclear policies, standards and lack of data ownership
- Processes and procedures are inconsistent, and if in place, they are not sufficiently integrated to secure data integrity and accessibility
- Business organizations are not held accountable for ensuring adherence to data quality standards and some organizations see data quality solely as an IT issue
- Technology is not integrated to support information flow and data management is widespread, often manual, local, incomplete, or duplicated and redundant
- Executive Leadership is usually unaware of the magnitude of operational inefficiencies caused by data quality issues and very few organizations are equipped to measure the level of accuracy

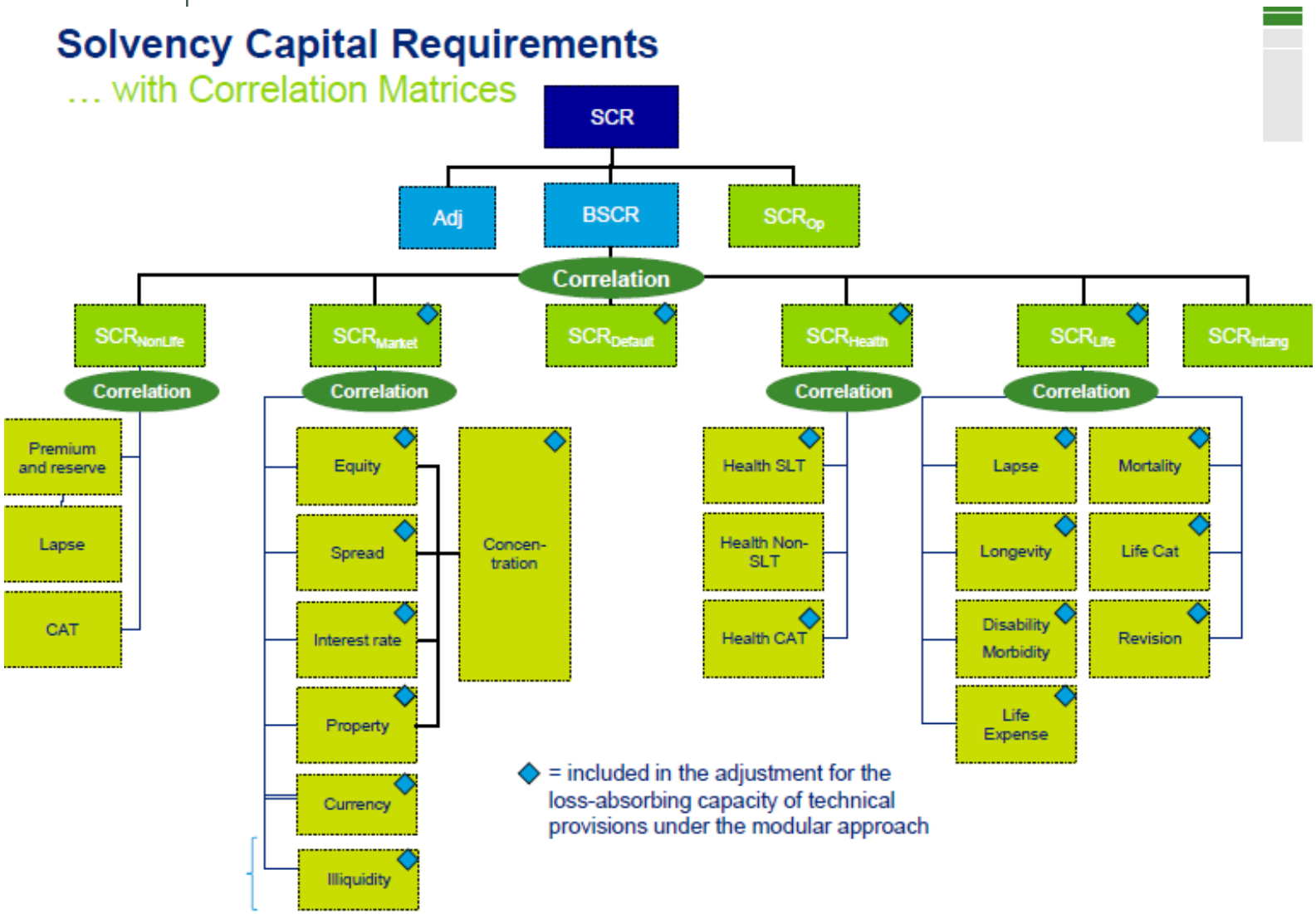
Data Quality

- Data is the primary input which feeds economical and technical calculations and for this reason, data quality has deep impacts on calculations by:
  - Affecting directly the consistency and accuracy of outcomes
  - Enabling to use a wider range of methodologies
  - Improving business knowledge
  - Consistency between finance and risk
- Assessment of data quality depends on its:
  - Appropriateness
  - Completeness
  - Accuracy



- These requirements are equally applicable to external data provided by third-parties or market data

Capital Requirements



Own Risk and Solvency Assessment (ORSA)

- Integral part of risk management system
- The assessment includes:
  - Overall solvency needs of the business taking into account specific risk profile, approved risk tolerances and business strategy
  - Compliance on a continual basis with capital requirements
  - Significance of how risk profile deviates from assumptions used to estimate SCR
- Requires processes proportionate to nature, scale and complexity of risks
- Enables insurer to identify and assess risks it faces in short term and long term and to which it is or could be exposed.
- Insurer must be able to demonstrate methods used in this assessment.
- Insurer must be able to update the assessment regularly and promptly when there is a significant change in the risk profile

Own Risk and Solvency Assessment (ORSA)

Process to Set Risk Appetite / Tolerance

Risk appetite should be **closely aligned to the pursued strategy**. The first step in linking risk to strategy is the explicit articulation of risk appetite in order to establish a benchmark with which actual risks can be compared

Risk appetite refers to the company's attitude towards risk taking and it is a function of not only the **willingness to take** either a high or a low level of risk on board, but also the **ability to take** risks.

Eventually risk limits and checks are not only a senior management tool, but should be **actionable input** for risk/business managers.

The firms' risk appetite & tolerance framework should foster board level debate on **actionable elements that clearly articulate firms' intended responses** to losses of capital and breaches in limits

Hierarchical structures may filter and delay information sent up the management chain. **Revamping the way information is presented to the board** should remove the disparity between the risks that the firm takes and those that the board perceives to be taking.

Three Lines of Defense - ERM

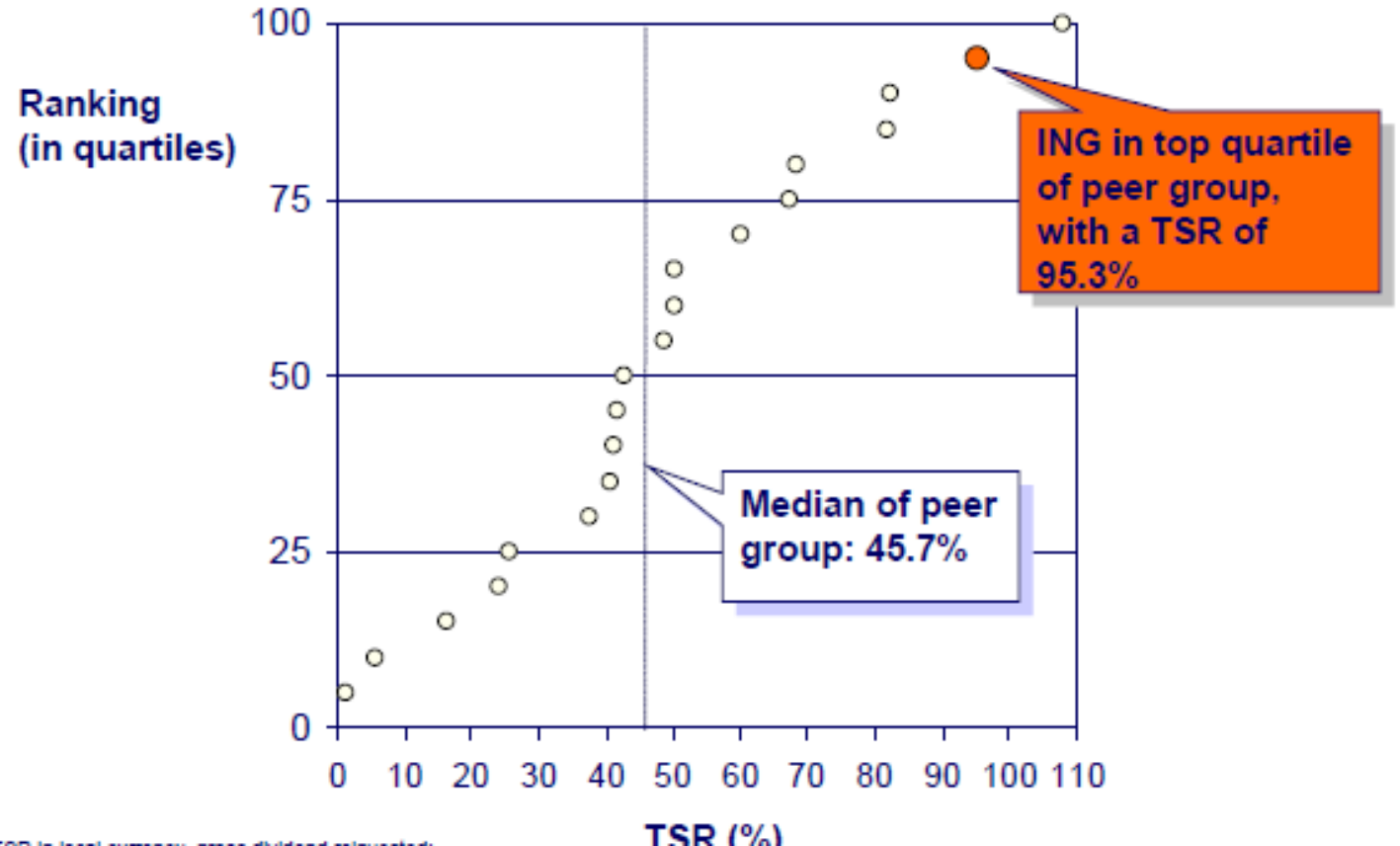
Key principles of the approach include:

- Heads of organisations businesses have **primary accountability** for the performance, operations, compliance and effective control of risks affecting their business (the "first line of defence").
- The risk management functions (the "second line of defence"):
  - ✓ **coordinate, oversee and objectively challenge the execution, management, control and reporting of risks**
  - ✓ are "independent" of the management & personnel that originate the risk exposures
  - ✓ have the power to escalate / veto high risk business activity
- The internal assurance function (the "third line of defence") is "independent" of both the businesses & risk functions and **provide independent and objective assurance** on the design and effectiveness of the overall system of internal control, including risk management activity performed by functions in both the 1st and 2nd lines of defence.

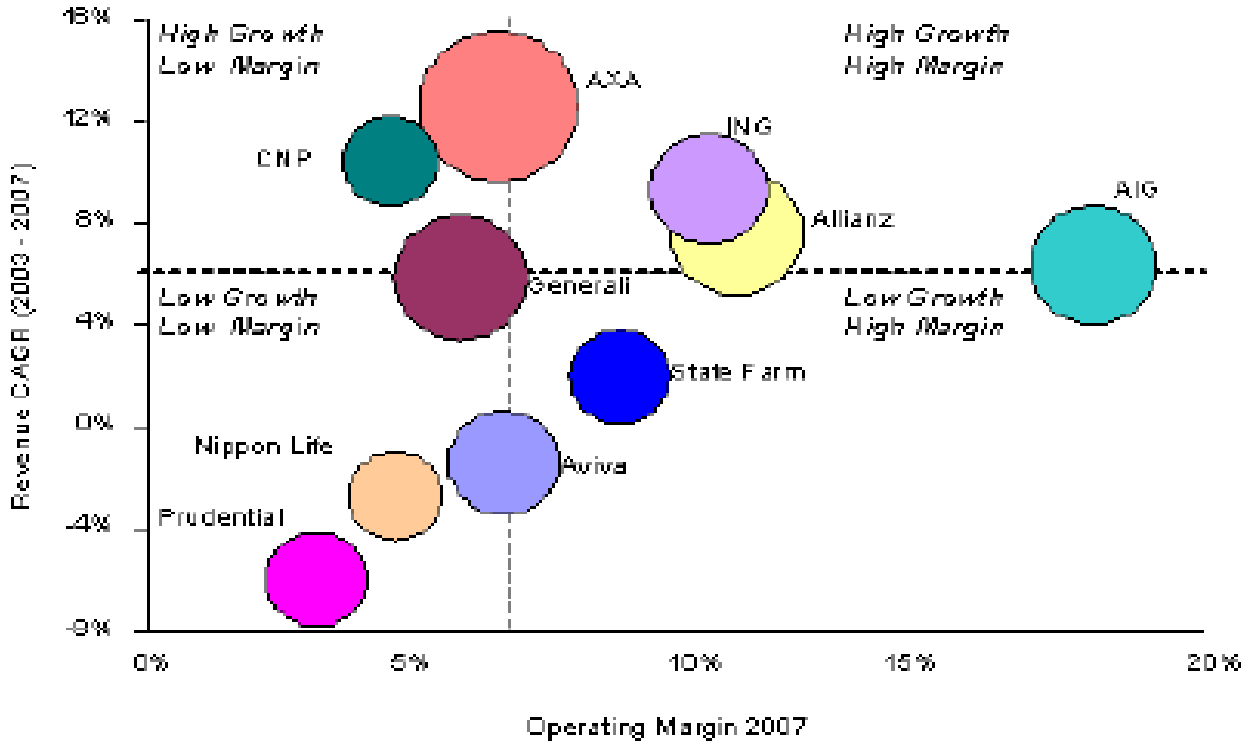
S&P rated ING's ERM Framework as "Excellent" with only one other European Group (AXA) in May 2008. Continuously outperformed peers…similar to AIG…enhanced returns do not come risk free!

… which contributes to meeting our objective of above median shareholder returns

TSR Performance 2004 to 31/3/2006 – compared to Peer Group



AIG 2007-2008: Leading the race to the finish line!



Source: The Top Ten Global Insurance Companies

On-Site Inspections

- **Risk factors heavily reliant on examiner's judgment without process to determine moderate or high risks.**
  - **Need to better justify risk assessment.**
- **Little or no integration on risk assessment through early warning systems, stress testing, statistical department, etc.**
- **No IT or fraud examination process (except periodically through the product approval department).**
- **Movement toward IFRS 4 from national accounting standards will create additional supervisory burden and increase the need for supervisory capacity building in this area.**

On-Site Examinations

Evaluation of risk-focused examination files.

- **Consistent payment to agents/brokers in excess of mandatory caps.**
- **Added fees such as production or marketing act as a proxy for excessive commissions.**

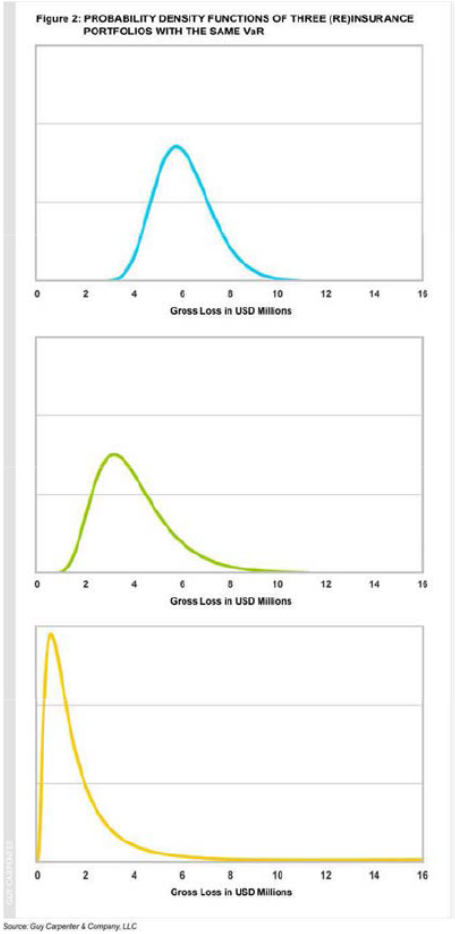
- **Early recognition of assets + back dating of claims can cause significant shifts in the EWS and RBC data.**
- **Need to have formalized document repository for verification of key risks.**
- **Pilot examination projects encouraged to enhance utilization of risk-based supervisory tools.**

Counterparty Credit Risk – Solvency II Issues

- **Risk models based on past data can lead regulators to underestimate the probability of extreme outcomes, and we cannot assume that (re)insurers have adequately managed reinsurance counterparty credit risk simply by arriving at a quantitative representation. Company management and insurance regulators also need strong qualitative skills. As part of a (re)insurer's risk management framework, no counterparty should be accepted without a comprehensive review of its financials, resources and people.**

VaR vs. TVaR - Problems with Methodology

- The portfolio represented by the distribution in blue has the highest average expected loss, but is actually the least risky, with its short tail, while the portfolio represented by the distribution in yellow has the lowest average expected loss, but is the riskiest because it has potential for much higher losses in its long tail. While tail value at risk (TVaR) shares many of the same limitations as VaR and may also contribute to volatility when relied upon as the sole measure of risk, it can be a better measure of underwriting risk. In this example, the VaR at 99.5 percent probability is USD10 million for all three distributions. However, the TVaR at the same level of probability is USD10.7 million for the blue distribution, USD11.4 million for the green and USD13.4 million for the yellow.



VaR vs. TVaR - Methodology

- This illustration vividly shows that the simplistic use of VaR to manage risk may result in increased concentrations and gross underestimation of exposure to tail events. It can also give a false sense of security that can contribute to the overcorrection in risk appetite following unanticipated events.

Solvency II – Proposed Reinsurance Treatment

- If two reinsurer groups are compiled, EIOPA suggests using the following risk factors to determine the capital requirement for the counterparty default risk:

  - LGD= max[50% · (RI recoverable + SCR gross−SCR net – Collateral

Solvency II – Proposed Reinsurance Treatment

Table 1

	AAA	AA	A	BBB	BB	B	CCC
AAA	1.12%						
AA	1.82%	2.51%					
A	3.52%	4.06%	5.61%				
BBB	7.42%	7.72%	8.94%	12.28%			
BB	27.28%	27.51%	28.63%	32.99%	45.50%		
B	50.04%	50.16%	50.78%	53.55%	64.27%	83.37%	
CCC	50.04%	50.16%	50.78%	53.55%	64.27%	83.37%	83.37%

- **The capital requirement for the counterparty default risk is then aggregated across all rating groups taking diversification into account.**

EU Reinsurance Treatment

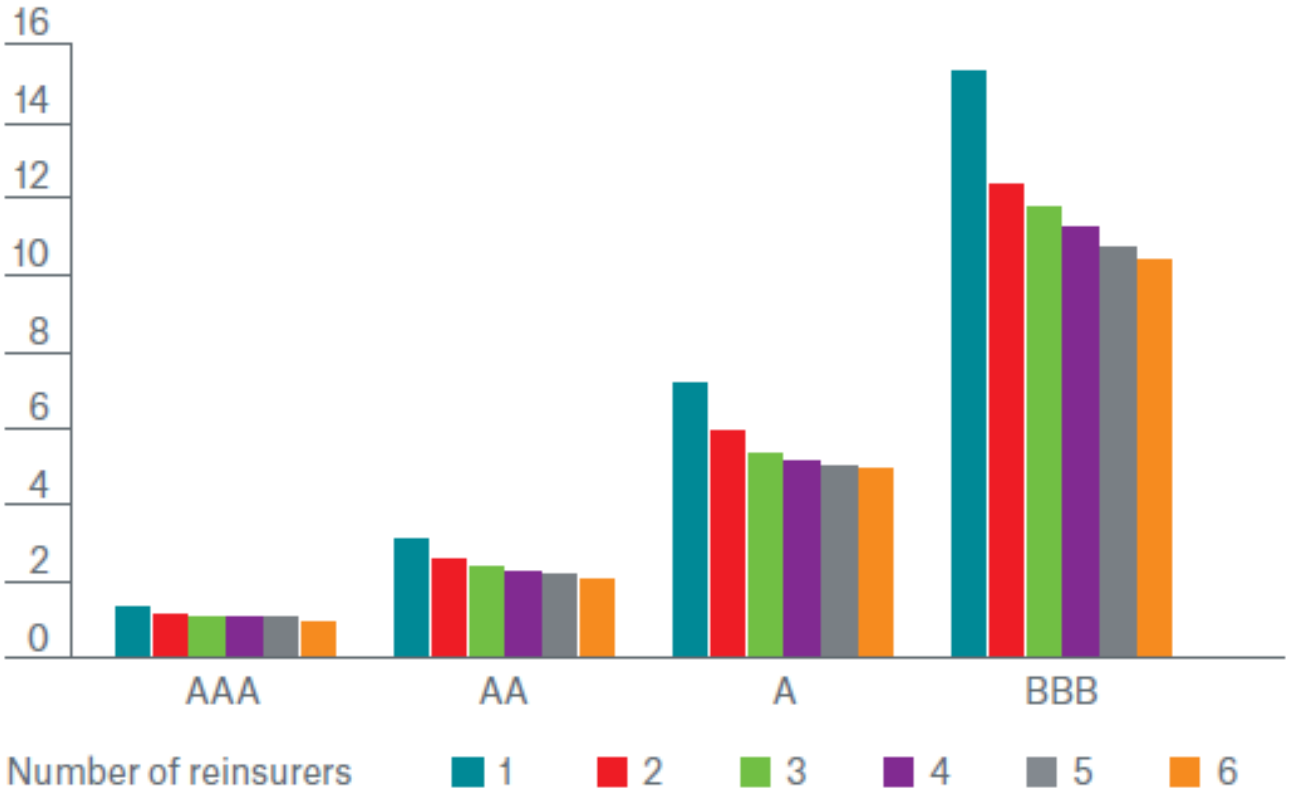
- Apart from financial strength, the number of reinsurance partners is an important factor in the measurement of the capital requirement. Risk management can help make a company less vulnerable to losses resulting from reinsurer default by diversifying its risk on reinsurers. However, it cannot be assumed that concentrating reinsurance on a single Reinsurer with a good rating will result in a higher risk than spreading it across a number of reinsurers with worse ratings.

EU Reinsurance Treatment

- As the chart on the next slide illustrates, the percentage of the LGD that must be held in risk capital almost doubles with each drop in rating class. For example, diversifying risk by changing from a single AA-rated business partner to six separate A-rated counterparties would increase the capital requirement by almost 2%. From a quantitative perspective, concentrating the risk on a financially strong company therefore appears to produce a better result.

EU Reinsurance Treatment

Figure: Counterparty default risk capital requirements
(in % of the sum of loss given default)



Counterparty Default Risk

Counterparty Default Risk—Quota Share Reinsurance Example

#		Item		Amt in Million	Notes
A. Basic business data					
1		Gross premium		100	Assumption
2		Ceded premium		25	As if 25% quota share
3		Net premium		75	Line (1) – Line (2)
4		Gross OS claims		150	Assumption
5		Ceded OS claims		37.5	25% of Line (4)
6		Net OS claims		112.5	Line (4) – Line (5)
7		Total recoverable		50	Ceded OS plus 50% of ceded premium Line (5) + 0.5 * Line (2)
8		One A-rated reinsurer			

Counterparty Default Risk

B. Solvency II risk characteristics					
9		$\sigma_{LOB, Prem}$		10%	Standard formula parameter
10		$\sigma_{LOB, Rsv}$		7%	Standard formula parameter

Counterparty Default Risk

C. Risk mitigation calculation					
		C.1 – Premium term			
11		Ceded Premium		25	Line (2)
12		$\sigma_{LOB, Prem}$		10%	Line (9)
13		99.5% factor		3	99.5%-ile of lognormal
14		Term 1 - premium risk		7.5	Lines (11)*(12)*(13)
15		Term 1 squared		56.3	Square of Line (14)
		C.2 – Reserve term			
16		Ceded OS		37.5	Line (5)
17		$\sigma_{LOB, Rsv}$		7%	Line (10)
18		99.5% factor		3	99.5%-ile of lognormal
19		Term 2 - OS risk		7.875	Lines (16)*(17)*(18)
20		Term 2 squared		62.0	Square of Line (19)

Counterparty Default Risk

		C.3 – Cross term			
21		Ceded OS		37.5	Line (5)
22		Ceded Prem		25	Line (11)
23		$\sigma_{LOB, Rsv}$		7%	Line (17)
24		$\sigma_{LOB, Rsv}$		10%	Line (12)
25		99.5% factor squared		9	99.5%-ile of lognormal
26		Term 3 - cross term		59.1	Lines (21)*(22)*(23)*(24)*(25)
		C.4 – Combined risk			
27		Sq Rt of Total		13.3	Sq Root of (Line 15+Line 20+Line 26)

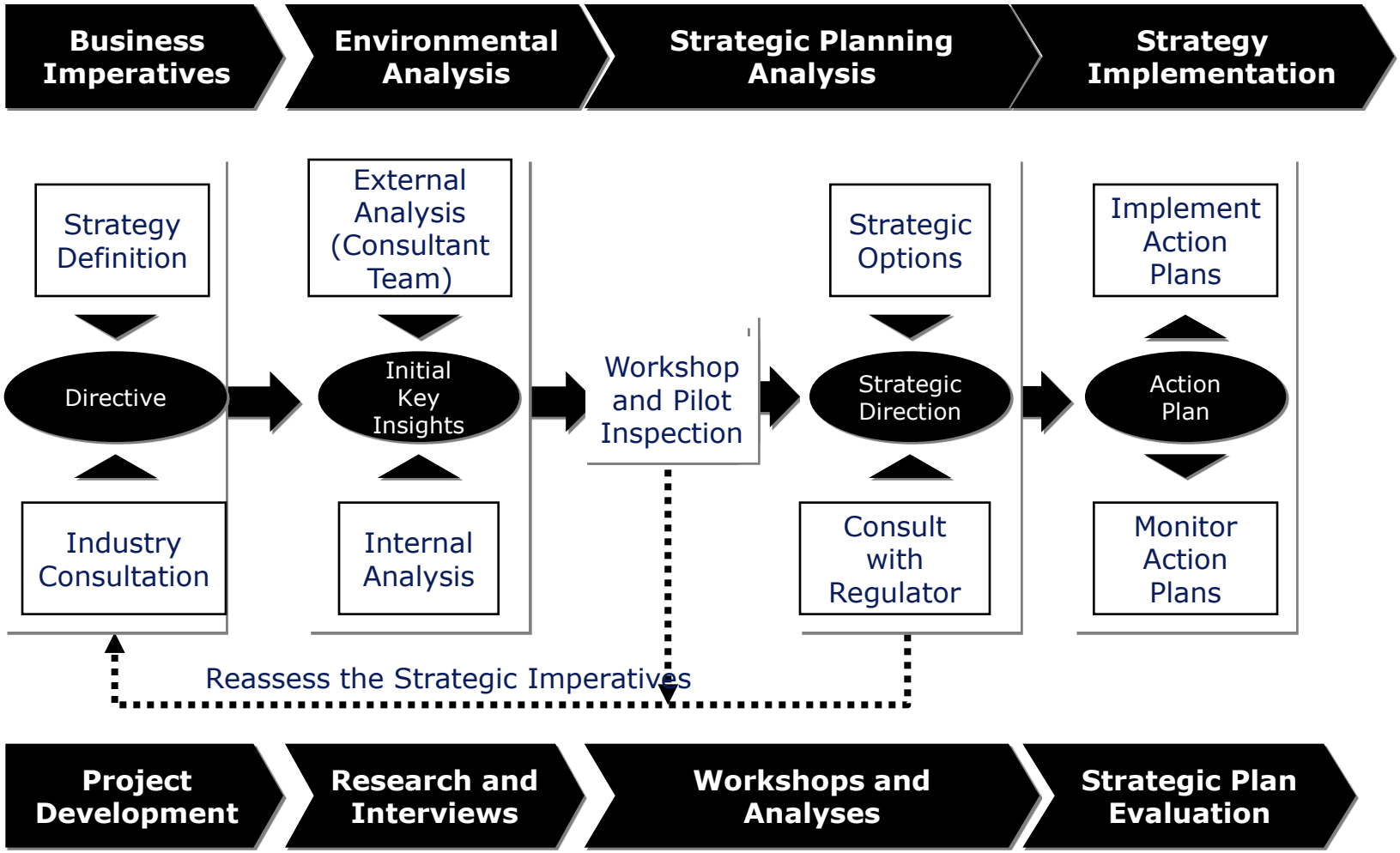
Counterparty Default Risk

D. Loss given default					
28		Recovery ratio		50%	Assumption
29		Collateral		0	Assumption
30		Risk mitigation		13.3	Line (27)
31		Recoverables		50.0	OS claims plus 50% of ceded premium
32		Loss given default (LGD)		31.7	Line (28)*(Line31+ Line30+-Line29)

Counterparty Default Risk

E. Probability of default at 99.5% level					
33		p_i		0.05%	Probability of single default Standard Formula parameter
34		Γ		0.25	Coefficient reflecting systemic risk Standard Formula parameter
35		y_j		31.7	Total LGD - Line (32)
36		z_j		1,002.2	Sum of LGD squared - Line 32
37		v_i		0.030%	Intermediate calculation (See QIS 5 Technical Specifications, SCR 6.14, page 137 of 330)
38		u_{ij}		0.020%	Intermediate calculation (See QIS 5 Technical Specifications, SCR 6.14, page 137 of 330)
39		σ^2		0.5009	Line 36 * Line 36 + Line 35 * Line 35 * Line 38
40		Σ		0.71	Square root of line 39
41		99.5% factor		3	99.5%-ile of lognormal
42		$SCR_{def,1}$		2.12	Line 40 * Line 41
43		$SCR_{def,1}$ as % of LGD		**6.7%**	Risk charge % of LGD - Line 42/Line 32 (6.7% if Table 5.1 A-rated reinsurer row)
44		$SCR_{def,1}$ as % of recoverable		4.2%	Risk charge % of recoverables - Line 42/Line 7

Strategy Development Framework



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