ERM for Emerging Risks in General Insurance
1. Corporate Governance
   (Board oversight)

2. Internal Control
   (sound system of internal control)

3. Implementation
   (appointment of external support)

4. Risk Management Processes
   (incremental phases of an iterative process)

   - Analysis (A1)
   - Risk Identification (A2)
   - Risk Assessment (A3)
   - Risk Evaluation (A4)
   - Risk Planning (A5)
   - Risk Management (A6)

5. Sources of Risk
   (internal to a business and emanating from the environment)

   - Internal Processes
   - Business Operating Environment
Risk and Opportunity Management Framework

Accountability
- to the company
- to owners
- to regulators
- to legislators
- to other stakeholders

Policy Formulation
- creating the vision
- creating the mission
- creating values
- developing culture
- monitoring the environment

Supervisory Management
- oversight management
- monitoring budgetary control
- reviewing key business results
- ensuring business capability

Strategic Thinking
- positioning in the changing markets
- setting corporate direction
- reviewing and deciding key resources
- deciding the implementation process

Governance review cycle
Strategy review cycle
Policy review cycle
Operations review cycle
Stages in the Enterprise Risk Management process

1. Analysis (A1)
2. Risk Identification (A2)
3. Risk Assessment (A3)
4. Risk Evaluation (A4)
5. Risk Planning (A5)
6. Risk Management (A6)
ERMC Process - Stage 1: Analysis

**INPUTS**
1. Appointment
2. Business objectives and plan
3. Process map and organogram
4. Value chain
5. Audit committee
6. Internal controls
7. Risk management plan
8. Financial reports
9. Marketing plan
10. Ratio analysis

**CONTRAINTS**
1. Business risk management culture
2. Risk management resources
3. Risk management study parameters
4. Risk management plan

**MECHANISMS**
1. Finance analysis tools
2. Risk management process diagnostic
3. SWOT questions
4. PEST questions
5. PESTEL analysis
6. Risk mapping
7. Causal modelling

**OUTPUTS**
1. Business analysis findings
ERM Process – Stage 2: Risk Identification

CONSTRAINTS
1 Business risk management culture
2 Risk management resources
3 Risk management study
4 Risk management plan

INPUTS
1 Business analysis
2 Assumptions
3 Uncertain events
4 Lessons learned
5 Issues

MECHANISMS
1 Risk checklist
2 Risk prompt list
3 PEST prompt
4 PESTEL prompt
5 SWOT prompt
6 Risk database
7 Process map
8 Business risk breakdown structure
9 Risk questionnaire

OUTPUTS
1 Risk register
ERM Process – Stage 3: Risk Assessment

**CONSTRAINTS**
1. Risk management resources
2. Risk management study parameters
3. Risk management plan

**INPUTS**
1. Risk identification
2. Risk register
3. Profit and loss account
4. Balance sheet
5. Industry betas

**MECHANISMS**
1. Probability distributions
2. Probability impact matrix

**OUTPUTS**
1. Risk register, including assessments
ERM Process – Stage 4: Risk Evaluation

**CONSTRAINTS**
1. Risk management resources
2. Risk management study parameters
3. Risk management plan

**INPUTS**
1. Risk register

**MECHANISMS**
1. Probability Trees
2. Expected Monetary Value
3. Utility Theory
4. Markov Chain
5. Investment appraisal

**OUTPUTS**
1. Risk register
2. Modelling results
3. Decision trees
4. Quantitative results
5. Scenario modelling
6. Sensitivity analysis
ERM Process – Stage 5: Risk Planning

CONSTRAINTS
1. Risk management resources
2. Risk management study parameters
3. Risk management plan

INPUTS
1. Risk register
2. Existing risk policies
3. Business risk appetite
4. Industry betas

MECHANISMS
1. Risk response flow chart
2. Response strategy

OUTPUTS
1. Risk responses
2. Updated risk register
ERM Process – Stage 6: Risk Management

**CONSTRAINTS**
1. Business risk management culture
2. Risk management resources
3. Risk management study parameters
4. Risk management plan

**INPUTS**
1. Risk database
2. Risk register
3. Risk responses

**MECHANISMS**
1. Meeting agendas
2. Proformas

**OUTPUTS**
1. Meeting agenda
2. Report format
3. Early warning indicators
4. Key performance indicators
External and Internal Sources of Risk

Internal Sources of Risk:
- Operational Risk
- Technological Risk
- Financial Risk

External Sources of Risk:
- Economic Risk
- Environment Risk
- Social Risk
- Legal Risk
- Political Risk
- Market Risk
<table>
<thead>
<tr>
<th>Case</th>
<th>Enterprise</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>American International Group</td>
</tr>
<tr>
<td>2</td>
<td>Long Term Capital Management</td>
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<tr>
<td>3</td>
<td>Union Carbide</td>
</tr>
</tbody>
</table>
1968
Greenburg appointed CEO

2000/01
Commits reinsurance fraud

2004
Is involved in price fixing with MMC

2005
SEC Charges AIG

2007
Fed Bail out Due to CDS Exposure

2008
CEO steps down

2009
New CEO decides to leave
1. A controlled corporate culture could have prevented employees going too far. The culture at AIG was heavily focused on succeeding at any cost. Adjusting accounting figures and dealing illegally with insurance companies could have been avoided if the company employed an effective corporate ethics policy.

2. A single business unit can bring down a whole organisation. A chain is only as strong as its weakest link.

3. Always consider all risks regardless of how unlikely they are to occur.

4. Effective management controls could have prevented the disaster.

5. Effective risk monitoring could have identified over exposure to certain risks.

6. With the benefit of hindsight, the organization had lost sight of its core business model, which was that of an insurance firm and not an investment bank.
LTCM was hedge fund founded in 1993 by John Meriwether. Its Board of Directors included Myron Scholes and Robert C. Merton, who shared the 1997 Nobel Memorial Prize in Economic Sciences.

Mathematical models → relative value or convergence arbitrage trades. Trading strategies made returns > 40% in 1995/96. Leverage ratio was 25:1. Off balance sheet position from swaps, options and derivatives. Credit spreads narrower and convergence trades → less profitable.

Mortgage-back securities market fell - returns from the fund were -6.42% and -10.14% and increasing leverage to 31. Exit of Salomon Brothers from the arbitrage business in July 1998 also had an adverse effect.

Russia defaulted on its government debt. Investors sold Japanese & European bonds to buy U.S. treasury bonds. LTCM lost $550 mn 21 Aug and by 31 Aug fund had lost $1.85 bn capital. leverage was 55:1.

Meriwether advised investors that the fund had lost $2.5 bn or 52% of its value over 1998; $2.1 billion in August; its capital base was just $2.3 billion. The fund required new investment of around $1.5 bn. No new investment was forthcoming.

External inspection of balance sheet shows assets of $125 bn, leverage. $1 trillion off balance sheet business

Lost $550 mn from equities. Counter parties concerned LTCM could meet future margin calls → liquidate their repo collateral.

FRBNY bailout $3,625 mn by creditors to avoid collapse in financial markets → 14 banks got 90% share; LTCM partners had 10% stake absorbed by their debts.
1. An organisation is only as strong as its weakest link.
2. Strategic thinking on business model could have prevented the disaster.
3. VaR has proved to be unreliable as a measure of risk over long time periods or under abnormal market conditions. The danger posed by exceptional market shocks can be captured only by means of supplemental methodologies.
4. The catastrophic losses were caused by systemic risks that LTCM had not foreseen in its business model. The failure of the hedge fund LTCM provides a classic example of model risk in the financial services industry.
5. LTCM provides a reminder of the notion that there is no such thing as a risk-free arbitrage. Because the arbitrage positions they were exploiting were small, the fund had to be leveraged many times in order to produce meaningful investment returns. The problem with liquidity is that it is never there when it is really needed.
6. As LTCM's capital base grew, they felt pressed to invest that capital and had run out of good bond-arbitrage bets and led it to undertake more aggressive trading strategies.
7. LTCM failed because both its trading models and its risk management models failed to anticipate the cycle of losses during an extreme crisis when volatilities rose dramatically, correlations between markets and instruments became closer to 1, and liquidity dried up.
8. Risk control at LTCM relied on a VaR model. However, LTCM’s risk modelling was inappropriate and let it down.
9. The theories of Merton and Scholes took a public beating. In its annual reports, Merrill Lynch observed that mathematical risk models "may provide a greater sense of security than warranted; therefore, reliance on these models should be limited."
10. Effective management controls could have prevented the disaster.
Faulty valve allows water to mix with MIC. Coolant from the MIC tank refrigeration unit had been used elsewhere. The VGS was out of action.

The safety valve gave way sending out a plume of MIC gas – exposing 521,000 and killing 3,800 people. No emergency procedures. No warning sirens. Public services had no info on what the gas was or on its effects.

Rigorous ERM engenders transparency and disclosure to its stakeholders in order that they can make informed decisions and consider their own risk appetite.

Indian Government -22% stake - & UCC establish UCIL Bhopal pesticide plant

1970

Changes in UCIL business model i.e. backward integration, tries to sell plant, decides to move relocate processes whilst keeping plant operating.

1984

UCIL Safety and procedures are inferior to UCC standards and deteriorate further. Local Government doesn’t want to rock the boat.

Risk Incident – Pressure rises in methyl isocyanate (MIC) storage tank and leak reported. Non functioning Vent Gas Scrubber (VGS) so unable to neutralise the toxic MIC leak. No Action is taken.

1984 2nd Dec:

Strategic thinking on the business model is input to ERM. ERM should map the business model and the entire value chain as it changes and evolves.

Corporate culture needs to encourage and promote adherence to risk management. UCIL culture led to degraded safety procedures and equipment.

23:00:00

Effective internal controls and risk incident reporting should have alerted management i.e. critical equipment and process failures, risk of an exothermic reaction.

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The safety valve gave way sending out a plume of MIC gas – exposing 521,000 and killing 3,800 people. No emergency procedures. No warning sirens. Public services had no info on what the gas was or on its effects.
1. An organisation is only as strong as its weakest link.

2. Reputational damage travels swiftly and is difficult to salvage.

3. Strategic thinking on business model could have prevented the disaster.

4. Corporate ethics policy based on best practice could have prevented the disaster.

5. The court proceedings revealed that management's cost cutting measures had effectively disabled safety procedures essential to prevent or alert employees of such disasters.

6. The severity and impact of the event were also made worse by the lack of safety standards and effective containment measures at the factory in Bhopal. The physical manifestations of these failures included unreliable monitoring equipment, inoperative safety equipment, unsuitable and inadequate gas suppression equipment and alarm systems which failed.

7. Although Dow Chemical has since taken over Union Carbide and denies responsibility for this disaster, the fact that it is much larger than what was once Union Carbide and its Union Carbide India Ltd. subsidiary, ongoing litigation continues to haunt the parent company.

8. Each operational business unit needs to recognise the likelihood and consequences of the risks that they face. A risk event at a small foreign subsidiary can bring down the entire enterprise - risk management at all levels should recognise that the potential for catastrophes always exists and that their impact can have both a large scale and a long-term impact.

9. We can never predict risks of this major consequence, but an enterprise should accept that the risk always remains of a catastrophic disaster. The foundation of a risk management strategy needs to be strong in its fundamentals, such as adherence to appropriate safety standards.

10. Effective management controls could have prevented the disaster.
<table>
<thead>
<tr>
<th>Early Warning Indicators</th>
<th>AIG</th>
<th>LTCM</th>
<th>Union Carbide</th>
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</thead>
<tbody>
<tr>
<td>1. Corporate culture analysis, monitoring and tracking</td>
<td>1</td>
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<tr>
<td>2. Corporate ERM governance policy and implementation</td>
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<td>3. Corporate ethics policy and its implementation</td>
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<td>4. CRO reports on ERM implementation progress and issues</td>
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<tr>
<td>5. Strategic thinking on business model (value chain, process)</td>
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<td>6. Reputational loss exposure watchlist (stakeholders, risks)</td>
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<td>7. Investigation of 'stars' (e.g. business units, individuals)</td>
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<td>8. Whistle blowing reports, analysis tracking</td>
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<tr>
<td>9. Internal audit reporting, training, compliance culture</td>
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<tr>
<td>10. Risk incident reporting, training and culture</td>
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<tr>
<td>11. Management controls on all material risks</td>
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<tr>
<td>12. Business model systems and internal controls</td>
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</table>
Conclusions – ERM Framework Model

- 6-stage iterative process model with feedback loops
- Corporate governance essential → lead from top
- Internal systems and controls essential
- Internal and external sources of risk
- Upside & downside → risk & opportunity management
Conclusions – ERM process model that might have helped

- Effective corporate governance, systems & controls
- Management awareness of business model & value chains
- Corporate culture assessment → regulatory review
- Scenario planning → stress testing extreme conditions
- Opportunity management of upside potential
Conclusions – Timelines for Unexpected Events

- The future is largely unpredictable
- The future unfolds rapidly for adverse risk incidents
- The historical perspective is often post-rationalised
- Timelines are rarely within the management’s control
- Timely service recovery requires agile management team
Conclusions – Emerging Risks from Unexpected Events

- The future is not what is used to be
- Black swans and fallacy of inductive logic
- The trap of false enthusiasm
- Emerging risks pro-activity versus re-activity
- Emerging risks with the benefit of hindsight
Conclusions - Lessons Learned

- Lessons from internal risk incident reviews
- Lessons from historical reviews and post-mortems
- Lessons from management role play exercises
- Lessons from scenario planning → team decisions
- Lessons from survival training → team decisions
Conclusions – Early Warning Indicators that might have helped

- Every early warning indicator should be actionable
- Real-time early warning indicator dashboards
- Solvency II ‘Use Test’ → in the driving seat
- Indicator dashboard as a tool for management action
- Less can be more …
Conclusions – Corporate Governance that might have helped

➢ Early warning indicators for the governing body

➢ Pictures and storyboards → the ‘elevator’ test

➢ Solvency II ‘Use Test’ → can not be delegated

➢ Not just a ‘box ticking’ exercise

➢ No excuses for not understanding the business model
Questions or comments?

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 presenter.