The Actuarial Profession
making financial sense of the future

Conference title **Risk and Investment Conference 2010**
Speaker names George Orros (Chair) and Neil Cantle

ERM for Strategic and Emerging Risks

14 June 2010

Risk and Opportunity Management Framework

1. Corporate Governance
(Board oversight)

2. Internal Control
(sound system of internal control)

3. Implementation
(appointment of external support)

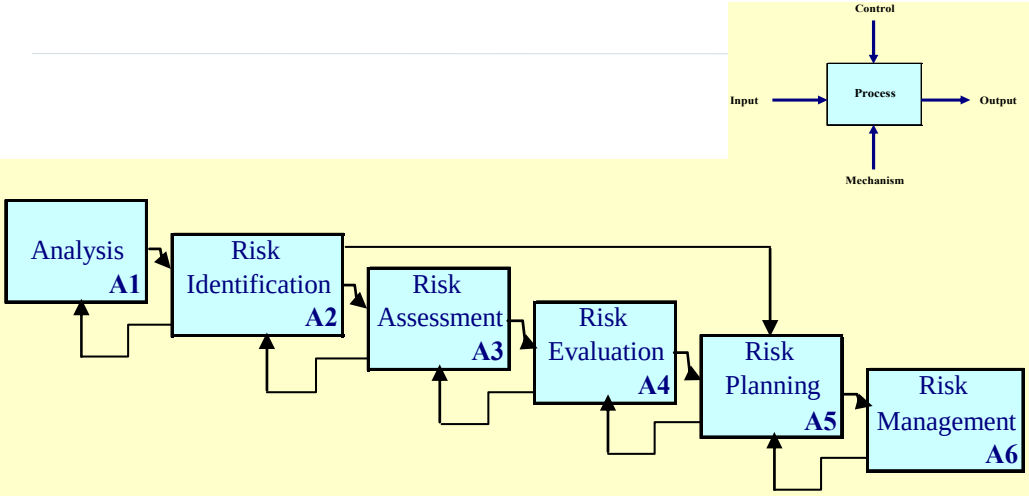
4. Risk Management Processes
(incremental phases of an iterative process)

Analysis A1 → Risk Identification A2 → Risk Assessment A3 → Risk Evaluation A4 → Risk Planning A5 → Risk Management A6

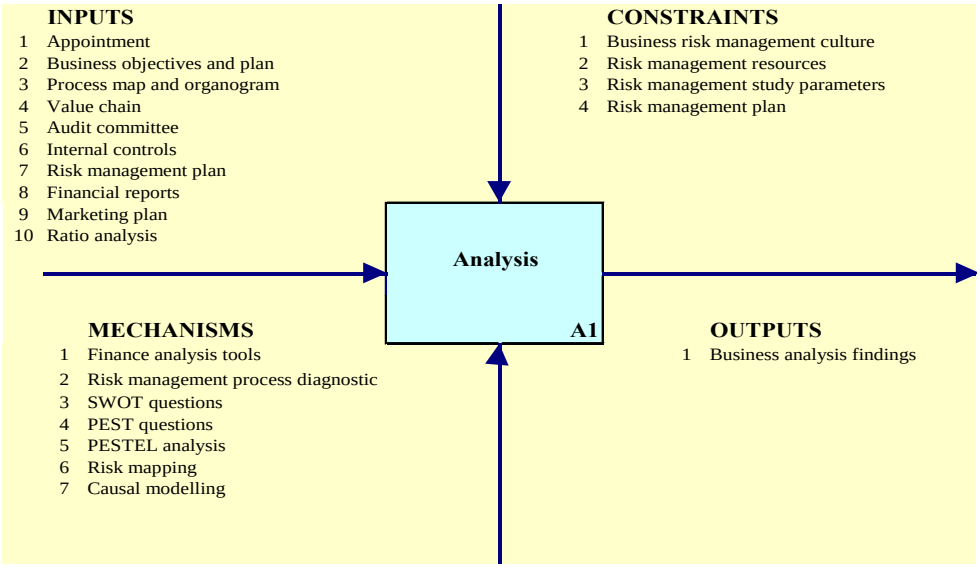
5. Sources of Risk
(internal to a business and emanating from the environment)

Internal Processes | Business Operating Environment

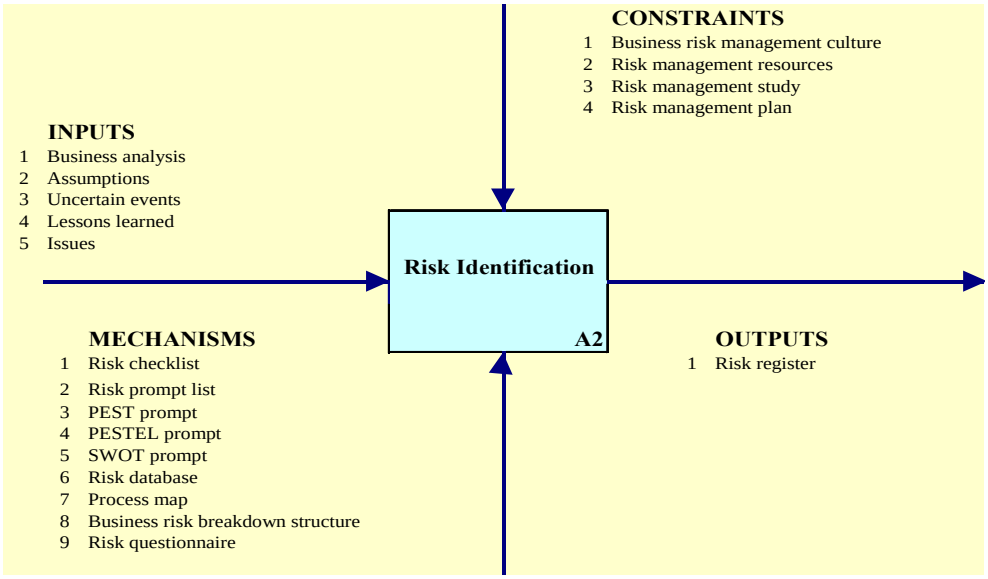
Stages in the Enterprise Risk Management process



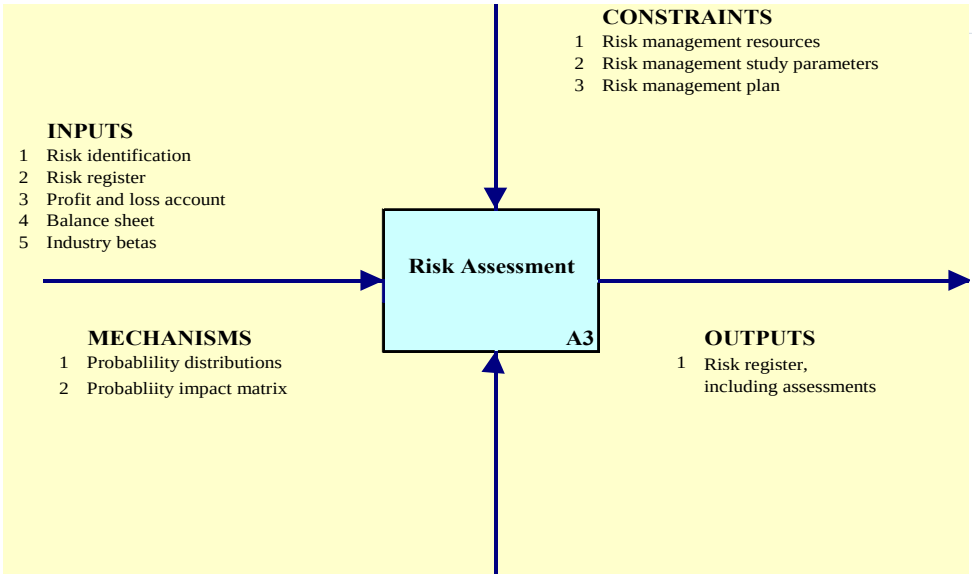
ERM Process - Stage 1: Analysis



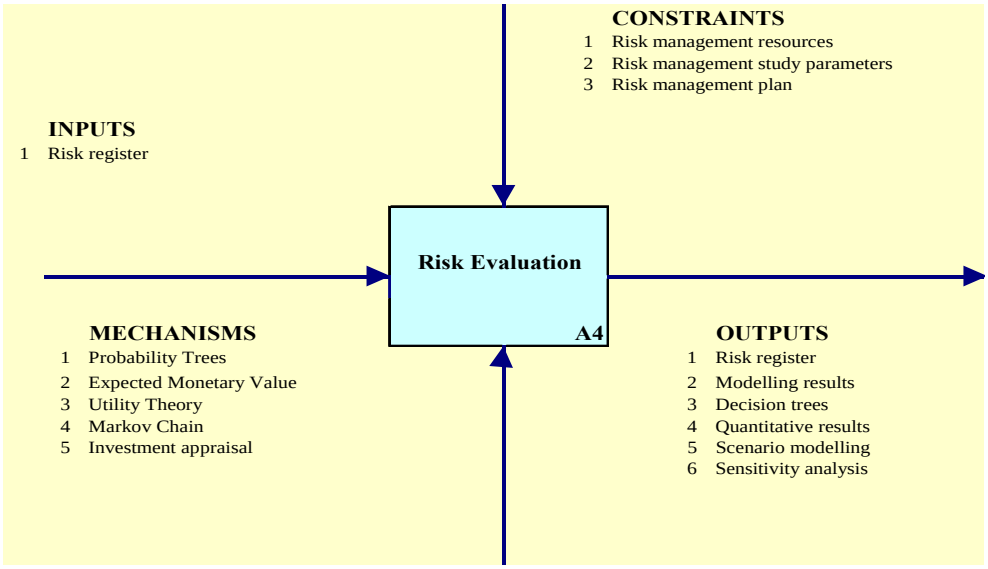
ERM Process – Stage 2: Risk Identification



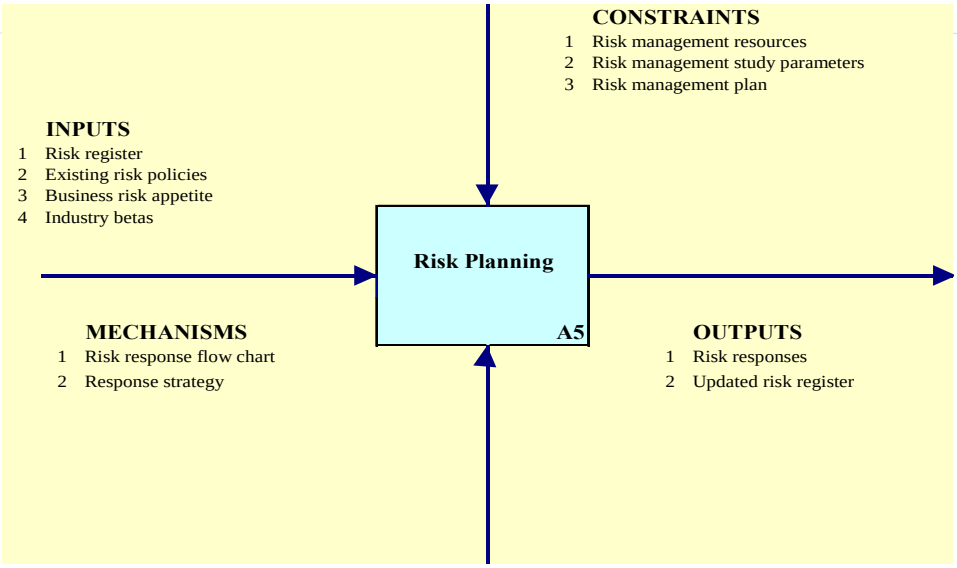
ERM Process – Stage 3: Risk Assessment



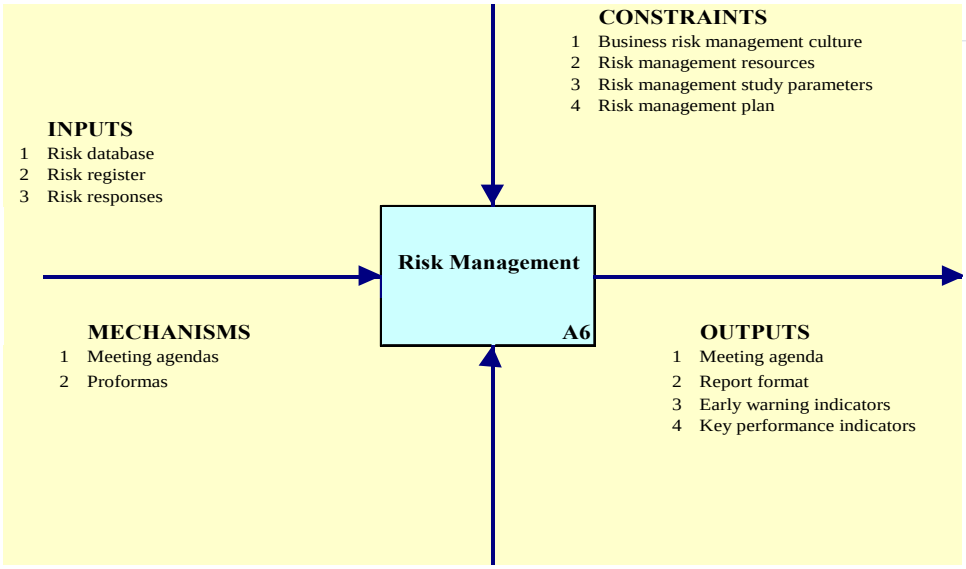
ERM Process – Stage 4: Risk Evaluation



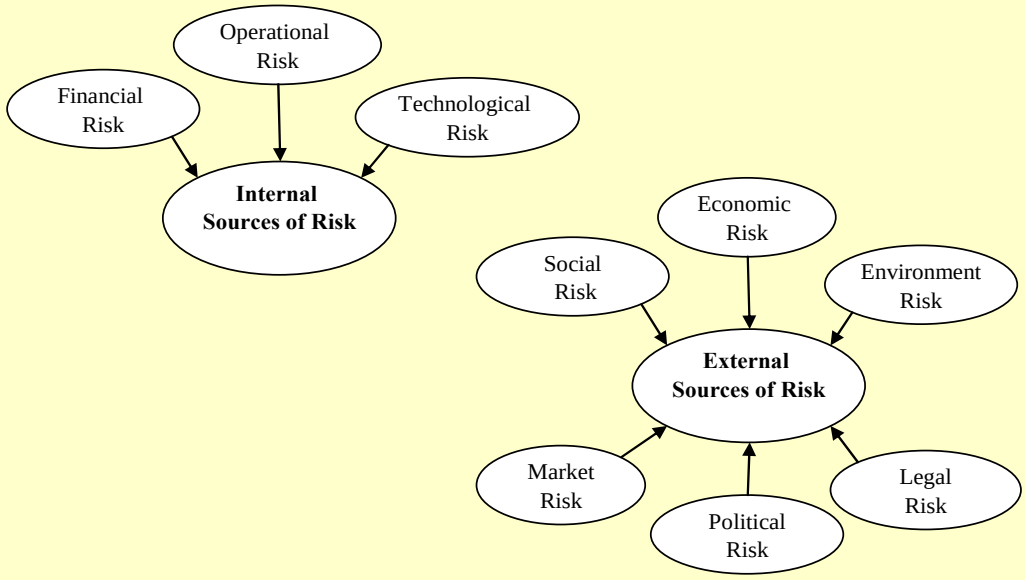
ERM Process – Stage 5: Risk Planning



ERM Process – Stage 6: Risk Management



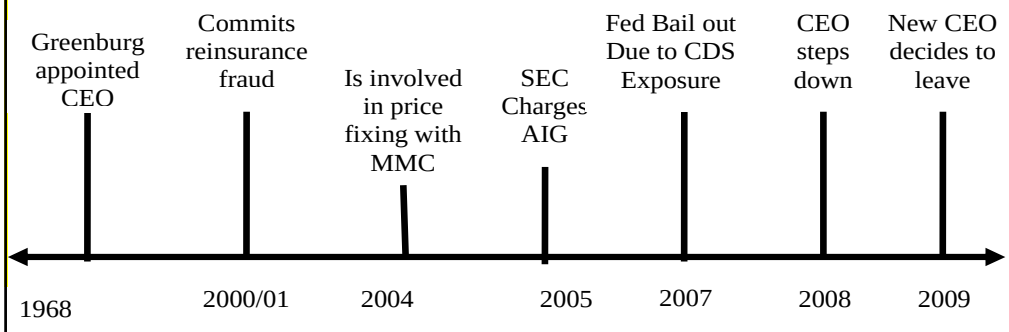
External and Internal Sources of Risk



Case Studies

Case	Enterprise	Author
1	American International Group	Rudolf Puchy, George Orros
2	Arthur Andersen LLP	George Orros
3	Baring Brothers	George Orros
4	CitiGroup	Neil Cantle
5	Equitable Life	Rudolf Puchy
6	Ericsson and Nokia	George Orros
7	Fannie Mae, Freddie Mac	Haijing Wang
8	Fortis	Neil Cantle
9	Long Term Capital Management	George Orros
10	National Australia Bank	Neil Cantle
11	Northern Rock	Haijing Wang
12	Royal Bank of Scotland	Rudolf Puchy
13	Societé Generale	George Orros
14	Union Carbide	George Orros

CS 1 AIG (American International Group) Timeline



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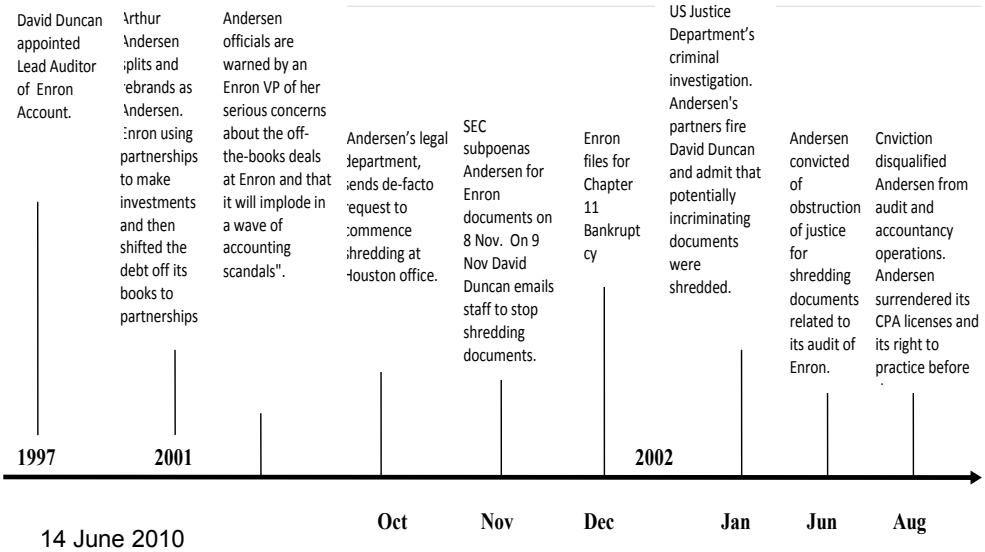
CS 1 AIG - Lessons Learned

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.

CS 2 Arthur Andersen LLP - Summary Timeline



CS 2 Arthur Andersen - Lessons Learned

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. With the benefit of hindsight, it appears that the organisation had lost sight of its core business model, which was that of an independent auditing firm.
6. The swift demise of the firm illustrates the need to consider risks throughout the enterprise. Subsequent investigation of its practices as an auditor identified that the Enron experience was not a unique set of circumstances but indicative of systemic weaknesses.
7. The quiet dilution of standards and the rise of auditor-salesmen at Andersen were central to the scandals that cost investors US$ billions, eliminated thousands of jobs and threatened the retirement security of millions. As the firm spiralled down, its leaders contended that conflicts between its auditing and consulting missions had no impact on the quality of its work.
8. The large fees that the firm collected from its auditing and consultancy activities resulted in professional conflicts of interest. Its endeavours at one of its offices to protect its consultancy fees had compromised its auditing standards.
9. The organisation's response to the catastrophic event arguably increased the severity of the impact on the firm. The public outrage and resulting damage to its reputation was particularly acute as so many innocent stakeholders, such as employees and small investors, were irretrievably harmed and the firm imploded.
10. Effective management controls could have prevented the disaster.

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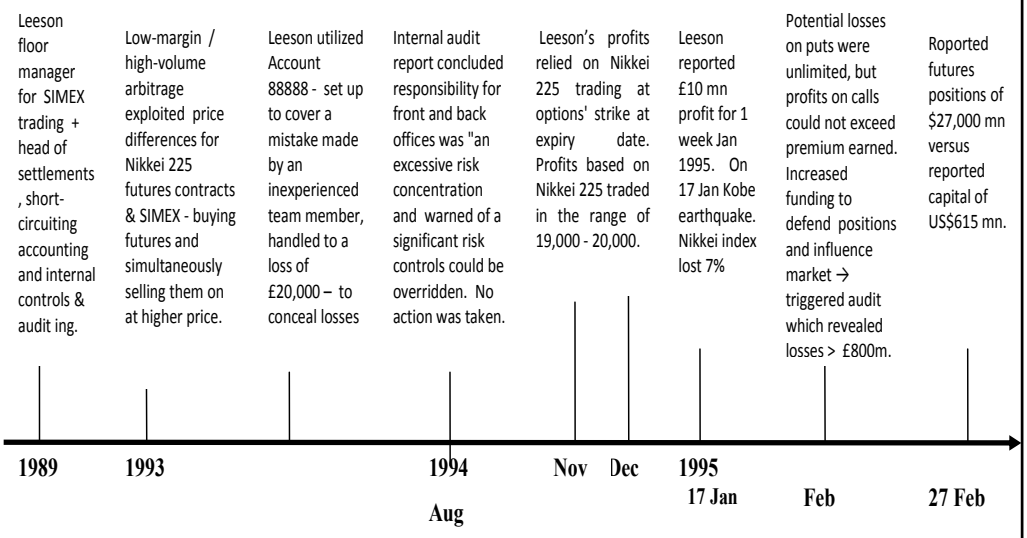
CS 3 Barings' Bank Summary Timeline



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CS 3 Barings Bank - Lessons Learned

1. An organisation is only as strong as its weakest link.
2. Reputational damage travels swiftly and is difficult to salvage.
3. Separation of trading from back office functions could have prevented the disaster.
4. Great success stories in the financial services industry should always be independently checked and monitored tigtly, in order to verify that the reported profits are for real and that the reported profits continue to be for real.
5. The collapse led banking regulators around the world to establish "segregation of duties" and "independent risk management" as core principles in risk management. Companies established risk management and back-office operations that were independent of the profit centres.
6. A prerequisite of effective risk management is that there should be a system of checks and balances to prevent any individual, or group of individuals, from gaining excessive power to take risks on behalf of an organisation.
7. Corporate governance and ERM have a similar focuses on strategic direction, corporate integration and motivation from the top management. Not only was poor risk management to blame for the incident, but so too was ineffective corporate governance. Companies with poor corporate governance practices often have poor risk management skills, and vice versa.
8. Operational risks are often interrelated with credit and market risks. Therefore, an operational risk failure during stressed market conditions can potentially be very costly. In this case, the confluence of events included ineffective corporate governance and management oversight.
9. Basel Committee 1998 limits on concentration risks could have prevented the disaster.
10. Effective management controls could have prevented the disaster.

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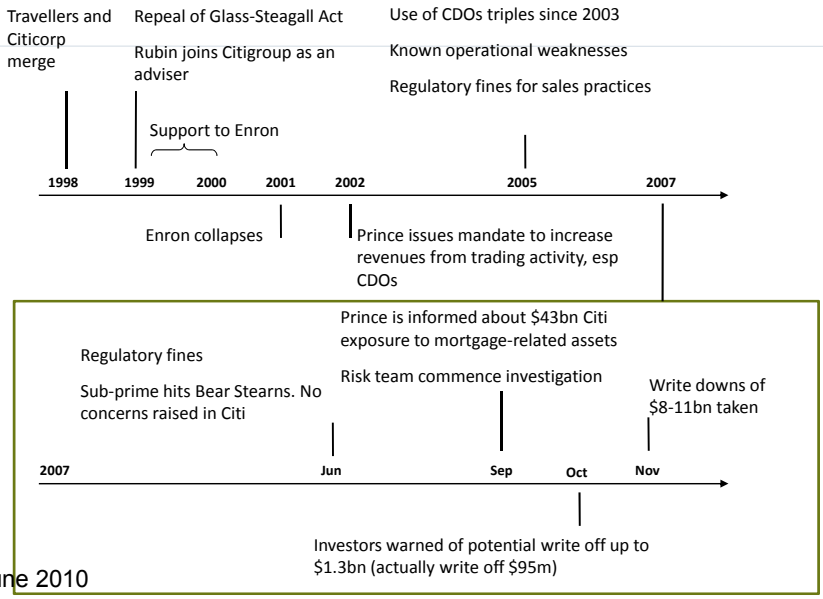
CS 4 CitiGroup Timeline



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CS 4 CitiGroup - Lessons Learned

1. Incentives encouraged short-term profit maximisation
2. Personal relationships within the organisation were able to limit the extent of risk management activity carried out i.e. personal loyalties outweighed the application of governance
3. Hard to determine the risk contained with complex product structures (e.g. CDOs)
4. Profits arising from risky transactions were taken to be more certain than they were and so expansion into the risk areas continued.
5. CEO without detailed background in areas driving bank's growth and relied on small number of trusted experts in the firm
6. Growth through acquisition left the structure with holes in governance and oversight and a mix of cultures between old businesses which led to fighting between business units
7. Banking regulation loosened to permit banks to move outside traditional areas into more exotic financial products.
8. Not possible to understand the actual risks being taken unless you were involved in the trading activity.
9. Lack of clear oversight with risk managers reporting to operational heads as well as oversight heads
10. Believed that the risk rating put onto complex products by rating agencies was correct and that the chance of default was unimaginably small.
11. Belief that the new complex products were safe led to excessive concentration and hence exposure to what turned out to be a highly risky asset
12. Accounting techniques used to move risky assets off balance sheet, which gave the impression of having more capital available to fuel additional growth. It is clear that this growth was based on very weak foundations as the real value of the risk had clearly been misunderstood and the capital should never have been released.

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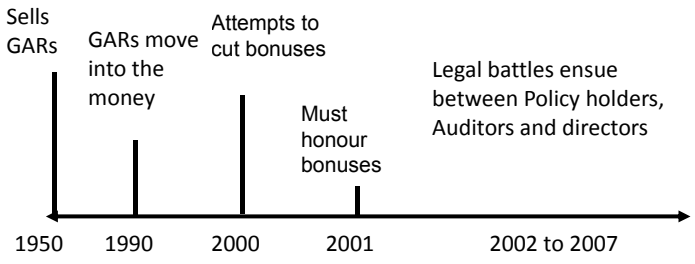
CS 5 Equitable Life



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CS 5 Equitable Life - Lessons Learned

1. Corporate ethics policy based on best practice could have prevented the disaster.
2. Reputational damage travels swiftly and is difficult to salvage.
3. Effective board management and an efficient governance system could have prevented the conflict of interest. The CEO and the Appointed Actuary should not be the same person.
4. Understanding the risks that the company is exposed to is critical in controlling the risks. Equitable did not consider hedging the cost the Guaranteed Annuity Rates.
5. Whistle blowing would have assisted, however given the role of the Appointed Actuary and the CEO were occupied by the same person. The regulators should have assessed the situation and stepped into resolve the conflict of interest and hopefully will do in the future.

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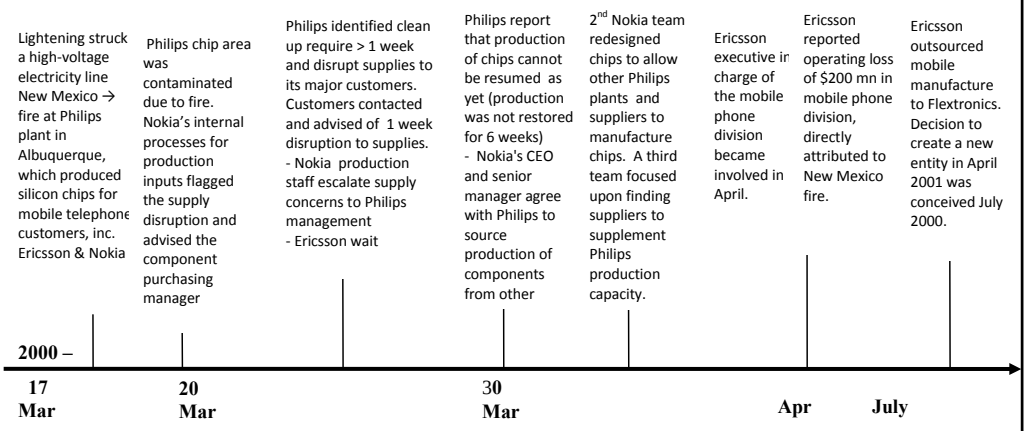
CS 6 Ericsson and Nokia Summary Timeline



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CS 6 Ericsson & Nokia - Lessons Learned

1. An organisation is only as strong as its weakest link.
2. The corporate culture issues contributed to the organisations lack of focus on the disruption of supplies issues over which it thought (at the local management level) that it had no control and made it vulnerable to any disruption.
3. The local management team was slow to report the 'disruption of supply' and logistics problem to senior management at headquarters, assuming that the disruption of supplies would not last long and so there was no need to escalate the disruption of supplies issue.
4. Risk management needs to be applied across the firm's value chain and to include all interconnected value chains e.g. suppliers.
5. Firm must take the broadest view of its own value chain and how and who it interfaces with.
6. Ericsson also did not appreciate the sheer scale, enormity and long-term consequences from a single failure in its value chain activities.
7. Effective management controls could have prevented the disaster.

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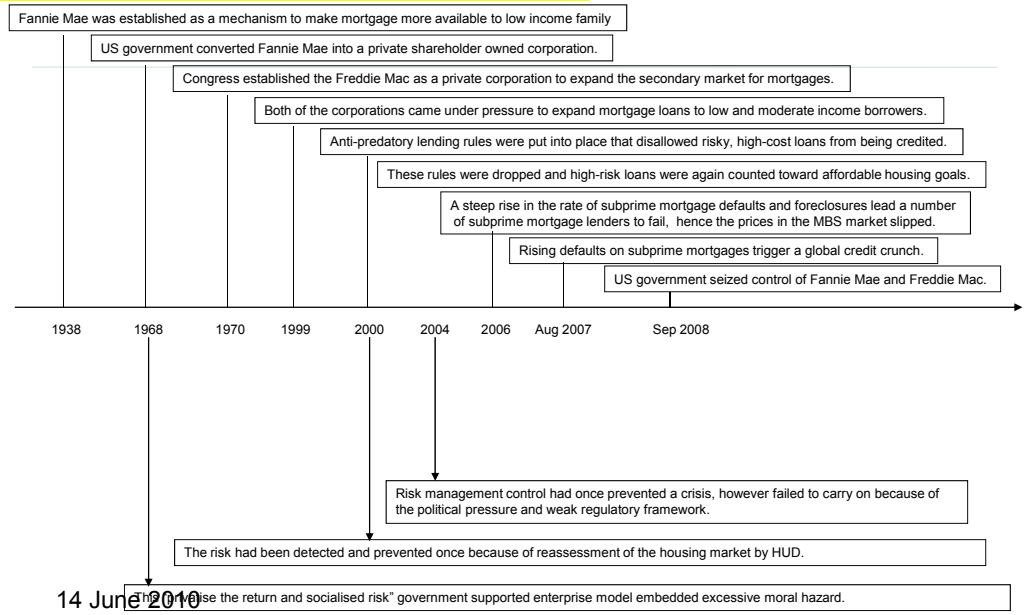
CS 7 Fannie Mae, Freddie Mac Timeline



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CS 7 Fannie Mae, Freddie Mac - Lessons Learned

1. Measuring and managing interest rate risk is probably the most important financial risk management issue facing Fannie Mae and Freddie Mac
2. Current GSEs model is clearly not working, reform is needed.
3. Inadequate capital standards
4. Remember that fundamental value always matters in the long run.
5. Always focus on risk management.
6. Increase transparency among regulated institutions
7. Homogenize global accounting standards
8. Homogenize global regulatory frameworks
9. Political Influence and Weak Regulatory Oversight
10. Clarify the roles and responsibilities of fiduciaries
11. Government guarantee from implicit to explicit.
12. Develop common sense compensation policies and practices

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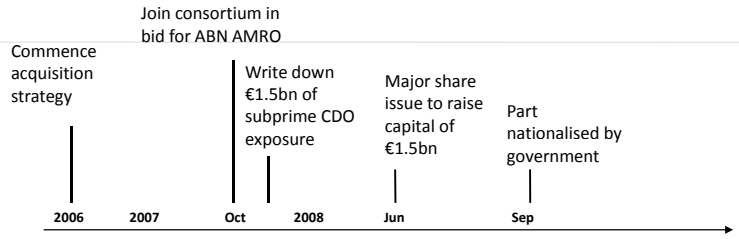
CS 8 Fortis Timeline



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CS 8 Fortis - Lessons Learned

1. Acquisition-led growth stretched capital base and liquidity
2. Large size relative to home market – systemically significant
3. Acquisition insufficiently considered – rapid response to market situation but lack of thoughtful due diligence
4. Price paid for ABN AMRO assets too high
5. Integration challenge very large
6. Exposure to US sub-prime too high
7. Lack of understanding about how a drying up of liquidity would impact the organisation during integration
8. Shareholder irritation at not being kept informed of funding requirements

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CS 9 LTCM Summary Timeline

1993 — 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.

1995 1996 1997 — 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.

17 Aug — 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.

21 Aug — 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.

2 Sep — 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.

1998 20 Sep — External inspection of balance sheet shows assets of $125 bn, leverage. $1 trillion off balance sheet business

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

23 Sep — 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

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CS 9 LTCM - Lessons Learned

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.

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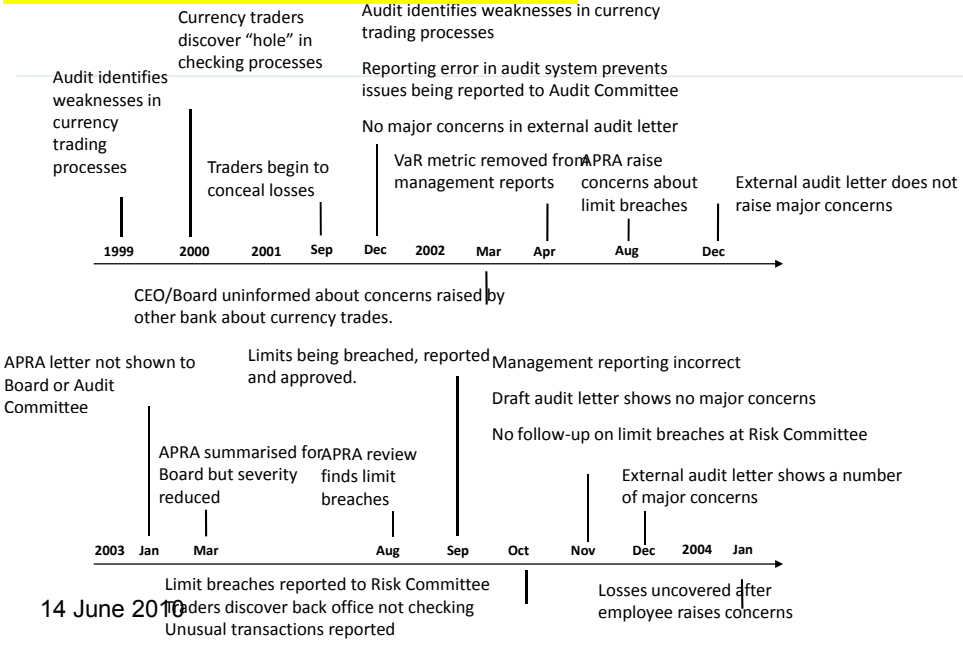
CS 10 National Australia Bank Timeline



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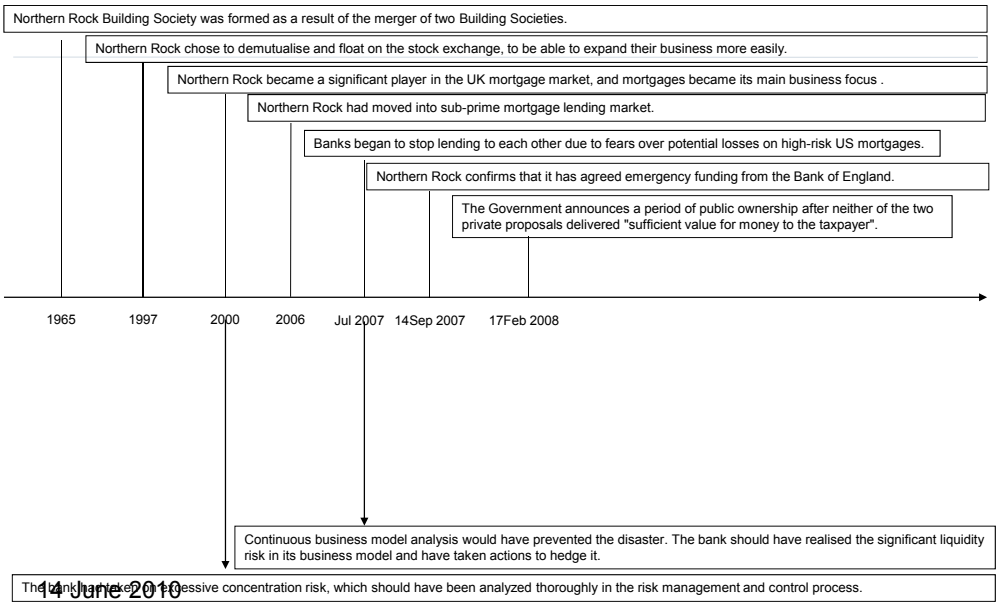
CS 10 National Australia Bank - Lessons Learned

1. Operational processes were insufficiently robust to prevent exploitation by knowledgeable staff
2. Culture was insufficiently focused on ethical behaviour
3. The Board received erroneous risk management information which did not alert them to the emerging issues
4. The Audit Committee did not receive any information which directly alerted them to the emerging issues in the trading area
5. The challenge from the Audit Committee was not strong enough to uncover the control weaknesses
6. The Board Risk Committee was not informed of risk limit breaches and was told that everything in the affected area was within VaR limits overall
7. Warnings about risk limit breaches were not escalated to the CEO or the Board
8. Audit points identified were not followed up on, failing to ensure that suitable control and procedure changes were made
9. Excessive focus on process, documentation and procedure manuals rather than understanding the substance of issues and taking responsibility for resolving issues.
10. Bad news was suppressed before reaching senior levels
11. There was a lack of adequate supervision of staff taking risk on the bank's behalf
12. There was a culture of ignoring risk limit breaches
13. Controls were poorly designed and insufficient to identify, investigate and explain suspicious transactions
14. Back-office procedures were insufficient to identify false transactions
15. Focus too much on profit at the expense of adequate control – pervaded the culture

CS 11 Northern Rock Timeline



CS 11 Northern Rock - Lessons Learned

1. Strengthening the financial system through domestic and international actions
2. Reducing the likelihood of banks failing
3. Reducing the impact of failing banks
4. Effective compensation arrangements in which consumers have confidence
5. Strengthening the Bank of England and improving coordination between authorities
6. Clear communication strategy with the public, especially in the extreme situation
7. The Bank should recognise that the spread between, say, 3-month Libor and the expected policy rate over the three month period (as measured, for instance, by the spread of three-month Libor over the 3-month Overnight Index Swap rate) can reflect liquidity risk premium as well as default risk premium. It should aim, through repos at these longer maturities, to eliminate as much of the 'term structure of liquidity risk premium as possible. This corrects a market failure.

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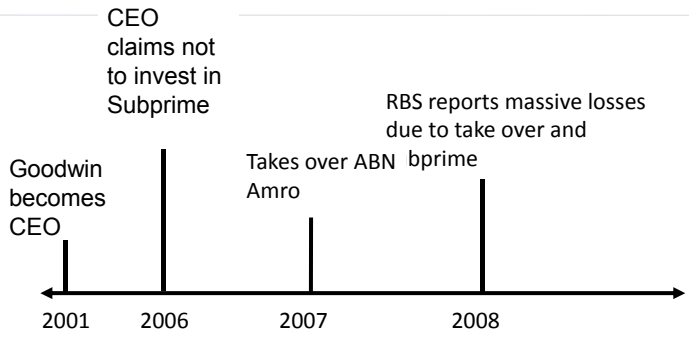
CS 12 Royal Bank of Scotland



CS 12 RBS - Lessons Learned

1. Corporate ethics policy based on best practice could have prevented the disaster. Reputational damage travels swiftly and is difficult to salvage
2. Effective board management and an efficient governance system could have prevented the disaster. Sir Fred Goodwin held too much power and was able to with-hold critical information on the holdings of sub-prime debt from the rest of the board.
3. Understanding the risks that the company is exposed to is critical in controlling the risks. RBS became largely exposed to the mortgage market both through conventional mortgages and sub-prime debt.
4. RBS conducted one of the worst timed takeovers when it led a consortium in the purchase of ABN AMBRO. If RBS had an efficient ERM strategy which covered the entire organisation, the risk of damaging the balance sheet in the purchase of ABN AMBRO could potentially have been averted.

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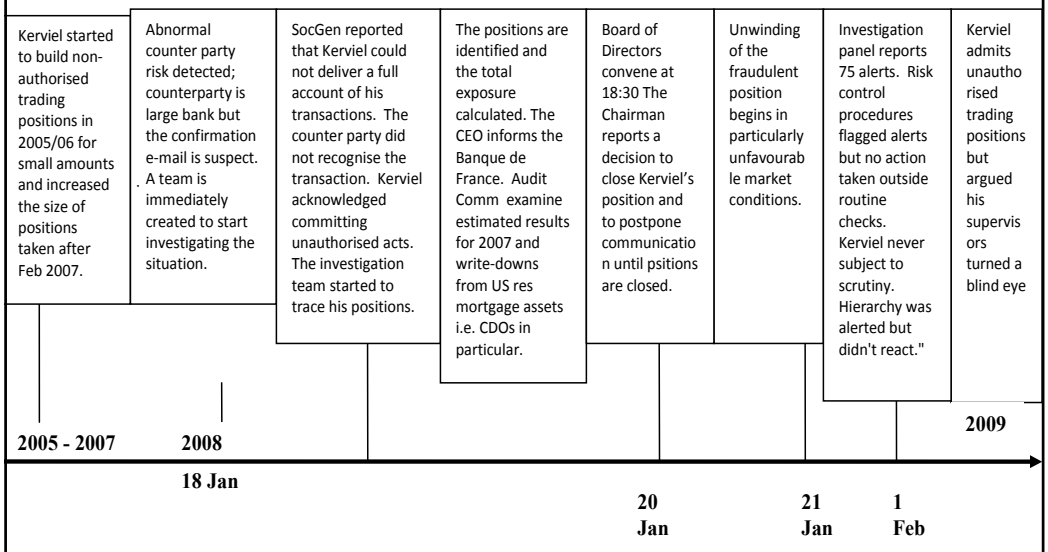
CS 13 Société Générale Summary Timeline



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CS 13 Société Generale - Lessons Learned

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. Basel Committee 1998 limits on concentration risks could have prevented the disaster.
5. The transactions that were built on the fraud were simple, positions linked to rising stock markets, but they were not detected by the management controls reporting system.
6. A prerequisite of effective risk management is that there should be a system of checks and balances to prevent any individual, or group of individuals, from gaining excessive power to take risks on behalf of an organisation.
7. Corporate governance and ERM have a similar focuses on strategic direction, corporate integration and motivation from the top management. Not only was poor risk management to blame for the incident, but so too was ineffective corporate governance. Companies with poor corporate governance practices often have poor risk management skills, and vice versa.
8. Operational risks are often interrelated with credit and market risks. Therefore, an operational risk failure during stressed market conditions can potentially be very costly. In this case, the confluence of events included ineffective corporate governance and management oversight.
9. Kerviel is not thought to have profited personally from the suspicious trades and claims that his actions were also practiced by other traders in the company. Although he exceeded his credit limits, he claimed that he was working to increase bank profits and that his employer was happy with his previous year's performance.
10. Effective management controls could have prevented the disaster.

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CS 14 Union Carbide Timeline

1970 Indian Government -22% stake - & UCC establish UCIL Bhopal pesticide plant

1984 Changes in UCIL business model i.e. backward integration, tries to sell plant, decides to move relocate processes whilst keeping plant operating.

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

1984 2nd Dec: 23:00:00 **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.

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.

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

1984 3rd Dec: 00:30:00 Faulty valve allows water to mix with MIC. Coolant from the MIC tank refridgeration unit had been used elsewhere. The VGS was out of action.

01:00:00 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

CS 14 Union Carbide - Lessons Learned

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.

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	Early Warning Indicators	1 AIG	2 Arthur Andersen LLP	3 Baring Brothers	4 Citigroup	5 Equitable Life	6 Ericsson and Nokia	7 Fannie Mae, Freddie Mac	8 Fortis	9 LTCM	10 National Australia Bank	11 Northern Rock	12 Royal Bank of Scotland	13 Société Generale	14 Union Carbide
1	Corporate culture analysis, monitoring and tracking	1	1	1	1		1			1	1			1	1
2	Corporate ERM governance policy and implementation	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3	Corporate ethics policy and its implementation	3	3	3	3	3	3	3		3	3		3	3	3
4	CRO reports on ERM implementation progress and issues	4	4	4	4	4						4	4	4	
5	Strategic thinking on business model (value chain, process)	5	5	5	5	5	5	5	5	5	5	5	5	5	5
6	Reputational loss exposure watchlist (stakeholders, risks)		6	6			6			6		6		6	6
7	Investigation of 'stars' (e.g. business units, individuals)	7	7	7	7					7	7			7	
8	Whistle blowing reports, analysis tracking	8	8	8		8				8	8		8	8	8
9	Internal audit reporting, training, compliance culture	9	9	9	9		9			9	9			9	9
10	Risk incident reporting, training and culture	10	10	10	10	10	10			10	10		10	10	10
11	Management controls on all material risks	11	11	11	11	11	11	11		11	11		11	11	11
12	Business model systems and internal controls	12	12	12	12		12			12	12		12	12	12
13	Supervisor's lead structure and regulatory framework							13				13			
14	Clear risk appetite and limits				14						14				

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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**

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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

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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

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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

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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

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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 …

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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

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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.