

# **Risk Management and the Actuary's role in Insurance**



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# What is Risk & Risk Management

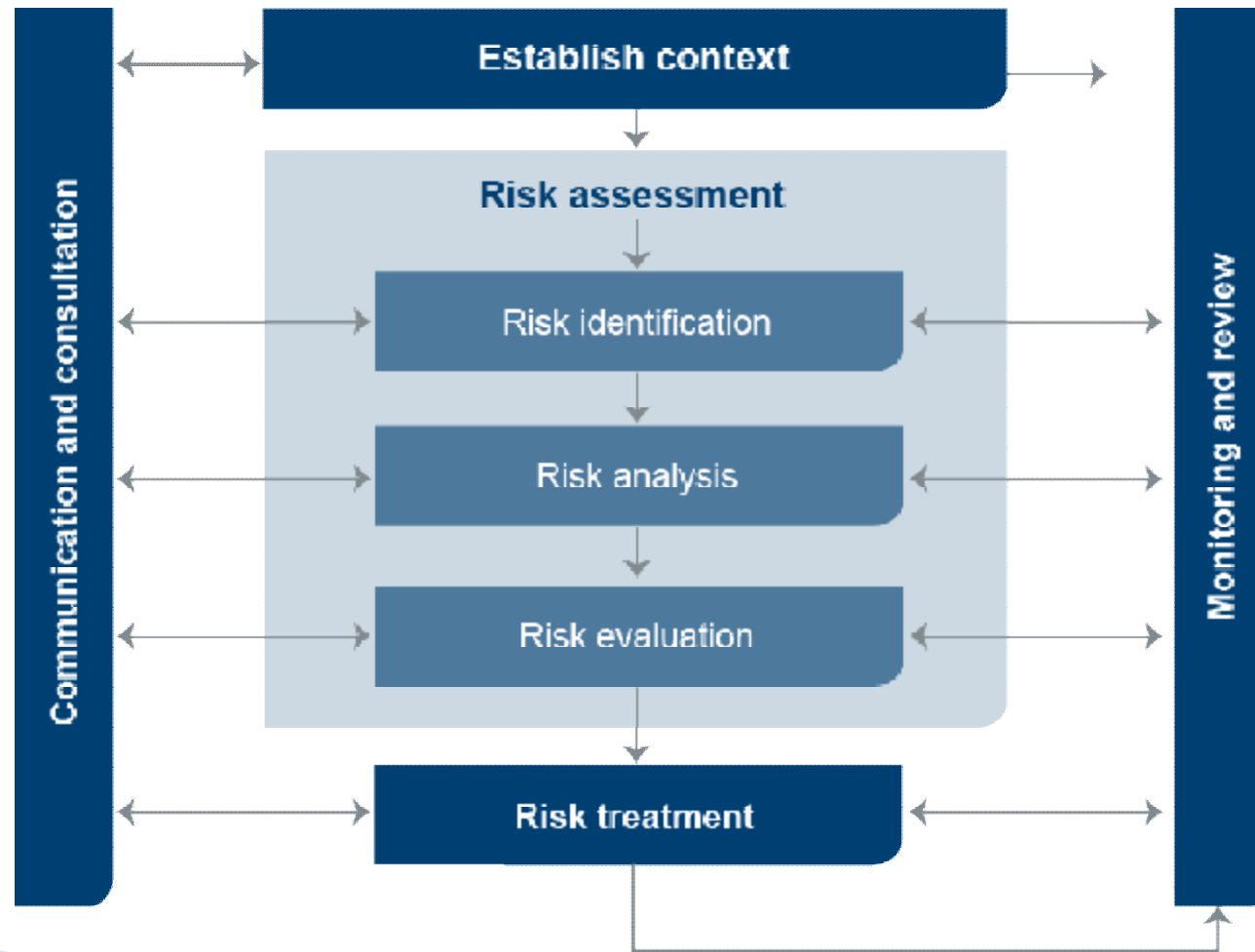
Risk is the 'effect of uncertainty on objectives'

An effect may be positive, negative, or a deviation from the expected. Also, risk is often described by an event, a change in circumstances or a consequence (ISO 31000)

Risk Management can be defined as the set of 'coordinated activities to direct and control an organisation with regard to risk'.

(ISO 31000)

# Risk Management Process (from ISO 31000)



Source: A Structured Approach to Enterprise Risk Management (ERM) and the requirements of ISO 31000  
IRM, AIRMIC, Alarm 2009

# Benefits of Risk Management

A man in a dark suit and tie is balancing on a tightrope. He has his arms outstretched to the sides. Below him is a cityscape with many buildings. The sky is overcast and grey.

**Being in a position to identify the risks early, improving efficiency**

**Having more predictable and certain outcomes**

**Allocating risk to those best placed to manage it**

**Preventing the over allowance of contingency**

**The business can plan ahead properly**

# Getting Started

## Outline Strategic Objectives

- Understand the strategic objectives of the organization

## Review Overall operations

- Understand the organization's operations and existing control environment

## Learn our risks

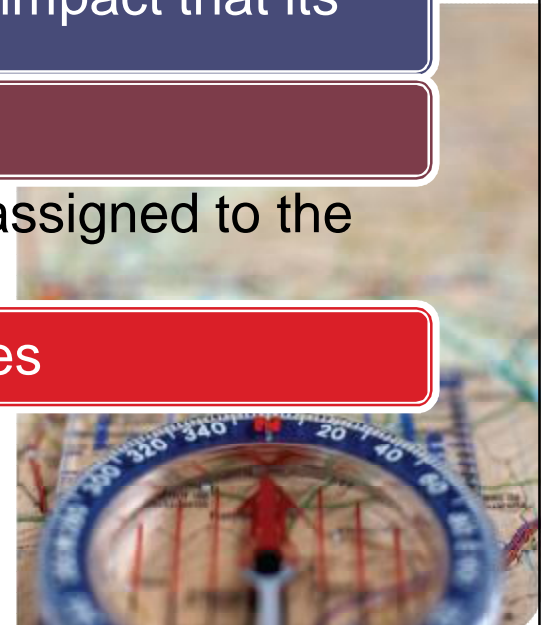
- Understand the organization's inherent risks

Determine the likelihood of a risk occurring and the potential impact that its materialization can have on the organization

## Prioritize our risks

- Set our risk management priorities based on the priority assigned to the various risks

## Consider various Risk Control (Risk Management) alternatives



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# What must be Done?

Define the risk universe

Agree on a common risk language and provide a risk education process

Assess the current state of risk awareness

Assess risks, Identify and evaluate any existing controls

Decide appropriate risk responses (accept, avoid, share, mitigate) to each of the risks in our risk portfolio

Define risk appetite and set levels of risk tolerance



# Risk Universe

Risk Categories should be based upon the requirements of the company. The following risk categories could be reflective of a Insurance Company's Risk Taxonomy

## Business Risks

- Underwriting
- Claims
- Pricing
- Emerging Risks
- Credit Risk

## Customer Risks

- Distribution channels
- Alliances
- Advertising and marketing

## Strategy Risks

- Risk of not following company's stated strategy

## Reputation Risks

- Potential brand damage

# Risk Universe

## IT / Infrastructure risks

- IT Systems
- Management information
- Disaster Recovery planning
- Business Continuity Planning

## Compliance Risks (related areas)

- Legal
- Regulatory
- Corporate governance

## People Risks

- All people management related risks
- Staff retention
- Succession planning issues

## Financial Risks

- Equity
- Interest Rate Risk
- Spread Risk
- Liquidity

# Actuarial role

$$S_{jk}(q) = \begin{cases} 1 + 8\phi_i \int_0^{r_{\max}} (P_{jk}(r) - 1) \frac{\sin(qr)}{q} dr & (2D) \\ 1 + 24\phi_i \int_0^{r_{\max}} (P_{jk}(r) - 1) \frac{\sin(qr)}{q} r dr & (3D) \end{cases}$$

where

$$\phi_0 = \begin{cases} \frac{\pi N}{4 L_s^2} & (2D) \\ \frac{\pi N}{6 L_s^3} & (3D) \end{cases} \quad n(r) = \phi_0 O(r) = \begin{cases} \frac{4N\phi_0}{\pi} 2\pi r = 8N\phi_0 r & (2D) \\ \frac{6N\phi_0}{\pi} 4\pi r^2 = 24N\phi_0 r^2 & (3D) \end{cases}$$

and  $P(r) = \frac{g(r)}{n(r)}$  with  $0 \leq r \leq L_s/2$

# What is an Actuary?

A Professional who attempts to quantify the impact of uncertain or risk contingent events. Actuaries estimate the financial consequences of risk using a combination of several skills, including:

- Mathematics
- Probability and Statistics
- Financial Theory
- Financial Economics
- Risk Theory
- Extreme Value Theory
- Information technology
- Basic programming skills
- Economics
- Business specific skills

# Where would you find an Actuary



Life Insurance



Risk Management



Non – Life  
Insurance



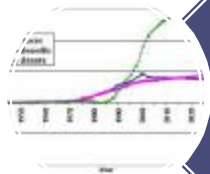
Banks



Pensions



Health Care



Social Security



Anywhere where  
risk needs to be  
quantified

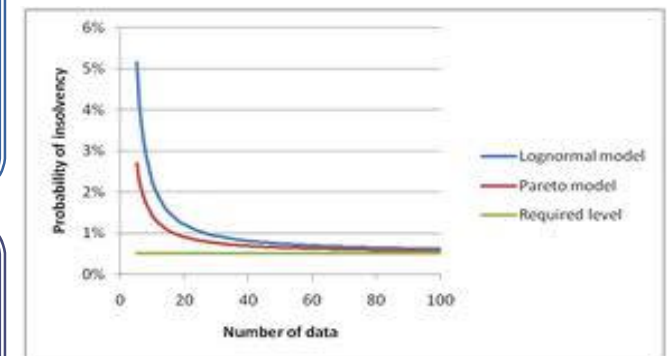
# Risk Management Role of an Actuary

Insurance companies are in the business of making profits through the acquisition and management of risks.

Actuaries usually lead the implementation of risk management frameworks for the identification, measurement and monitoring of risks.

Actuaries assess and manage the key risks that insurance companies are faced with such as market, credit, liquidity, operational and insurance risks.

Actuaries estimate and analyze the level of capital required for Companies to meet their risk strategy and identify the products that add value to the Company relative to the risk assumed.



# Value Added by Actuaries

Regulators internationally recognize the value added by Actuaries in both Life and Non-life insurance Companies.

Main concern of regulators is the protection of policyholders rather than the performance of Companies.

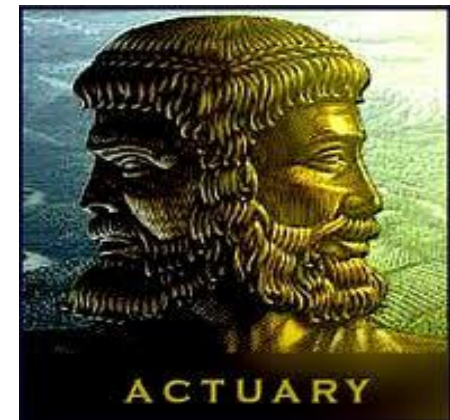
Main Concern of the Actuary is to strike a balance between the protection of policyholders and the performance of the company

Non-Life Companies without an actuary on board sometimes cannot appreciate or understand the value that Actuaries can add to their business.

# Actuaries in Non – Life Companies

In Non-Life Insurance, Actuaries are involved and can add significant value in several areas such as:

- Reserving
- Pricing
- Risk management
- Reinsurance modeling
- Financial Projections
- Reporting
- Modelling of any sort of uncertain or contingent financial event



**Predicting the future whilst (partly) looking at the past**



# Reserving

Reserving is an important consideration in both Life and General Insurance.

Reserving is the process performed by an actuary to mathematically determine the amount of money the company must have on hand to pay future claims.

The Actuary has to analyze the development of historic claims, assess the financial and business environment and estimate the future.

# Reserving

	Gross Paid Amounts Triangle for					c	Engineering				Cumulative
AccYr	1	2	3	4	5	6	7	8	9	10	Paid
2002	141	584	1,233	1,233	1,233	1,239	1,239	1,239	1,239	1,239	1,239
2003	558	2,402	2,621	2,622	2,622	2,622	2,649	2,649	2,649		2,649
2004	93	615	966	972	972	972	972	972			972
2005	192	1,325	1,440	1,440	1,441	1,441	1,441				1,441
2006	379	2,365	3,443	3,476	3,598	3,625					3,625
2007	409	5,028	5,316	6,130	6,165						6,165
2008	1,419	4,471	5,656	7,625							7,625
2009	378	7,187	10,398								10,398
2010	883	5,337									5,337
2011	1,684										1,684

Accident Vs Underwriting Year

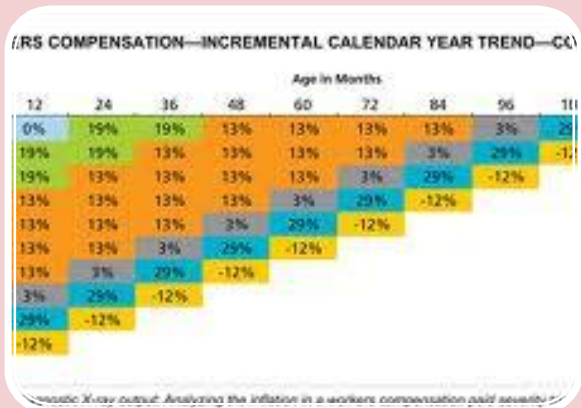
The Actuary Investigates the Triangles Formed for any Patterns or Trends

After a number of Development Years Claims reach their ultimate amount

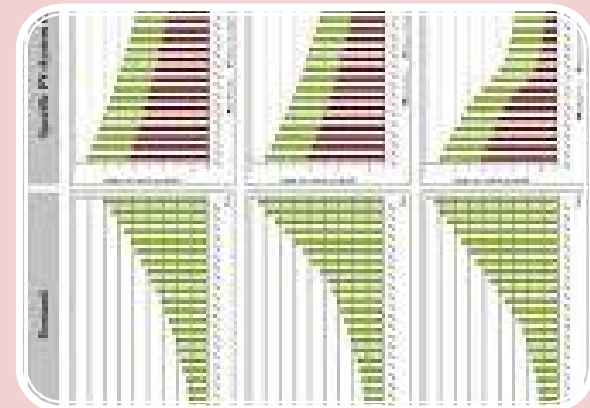
Historic Development of Claims can be the basis for estimating future development

Different Reserving Methods exist (from very simple to rather complicated ones)

# Non – Life Reserving



	A	B	C
Expected loss value:		0.1000	
# of Iterations of Loss		94	94
# of Iterations of No Loss		906	906
Iterations:		Random Value	Loss Event
1		0.034477957	
2		0.940354497	
3		0.101076756	
4		0.95615358	
5		0.2256947	
999		0.308588554	
1000		0.758466626	



Analyze historical data to assess the ultimate cost of claims stemming from Outstanding Claims as well as the in-force policies.

Methodologies employed recognize the likelihood of claims developing at both higher and lower levels than estimated by the claim handlers.

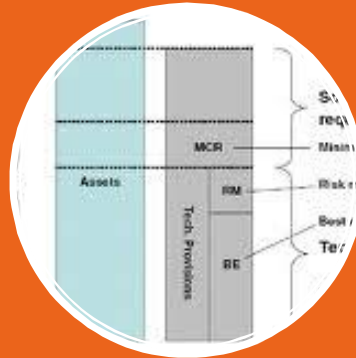
Methodologies employed recognize the likelihood of receiving claims which have not yet been reported (IBNR claims).

# Non – Life Reserving

Benefits of establishing adequate reserves :



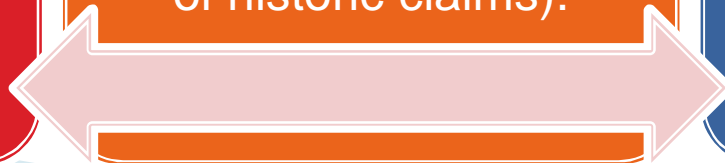
Compliance with regulations, compliance with financial standards and avoidance of unexpected losses in the future when claims are finally settled.



Estimation of accurate (“Best Estimate”) reserves provides to the management the true picture of the Company’s performance (BE reserves are used to assess the realistic cost of historic claims).



Future actions are taken based on the true picture of the Company’s performance ( increase/decrease premiums, attract/retain specific segments, stay in business or not, etc)



# Non – Life Pricing



Actuaries analyze historical data to assess the theoretical premium to be charged.



Analysis followed by discussions with various departments to ensure that final premium offered to customers is competitive.



The Pricing process helps identify profitable and non profitable segments of the Company.

# Non – Life Reporting

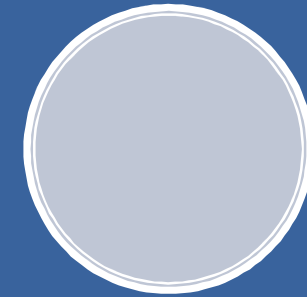
Actuaries can be instrumental in implementing Management Information Frameworks to enable the Company's management to make risk based decisions.



**Design and  
implement a  
monitoring  
system**



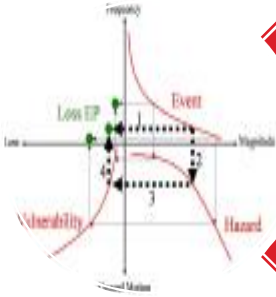
**Develop early  
warning system**



**Make risk  
based  
decisions**



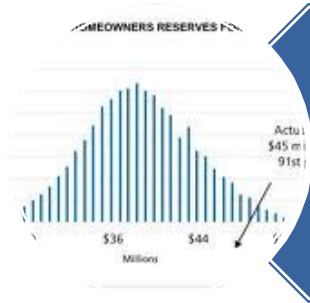
# Reinsurance Modelling



Actuarial science and its principles are at the heart of any reinsurance company

Loss	Random Value	Loss
1	0.034477957	
2	0.940354497	
3	0.101076756	
4	0.95615358	
5	0.2256947	
999	0.3085885	
1000	0.75	

In direct companies actuaries can model the behavior of their reinsurance programs and assess their effectiveness



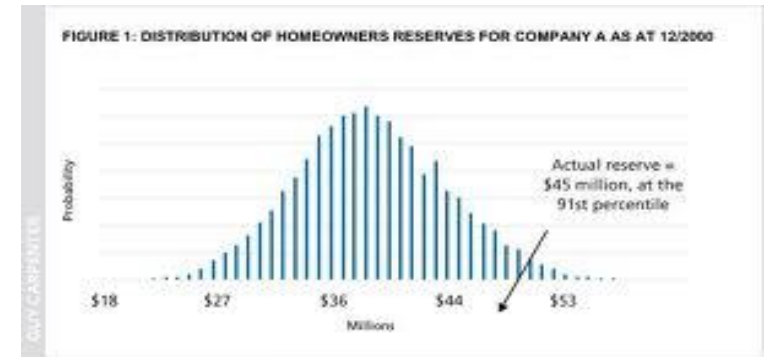
Actuarial principles and models can also be used to help optimize the reinsurance structure of a direct company

# Financial Projections

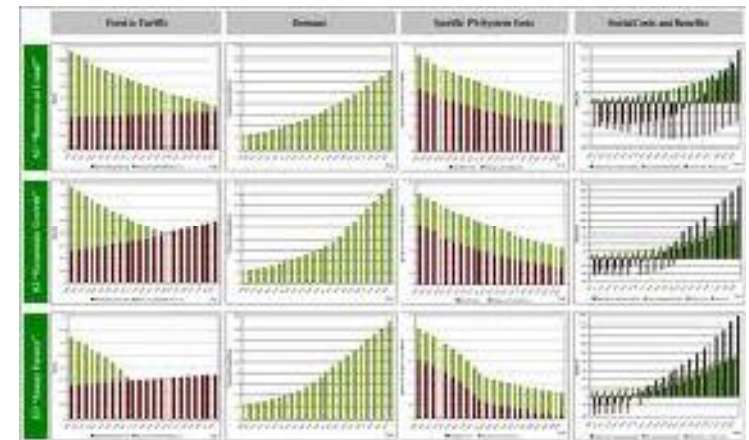
Actuaries can build and run financial projections model for a particular project or the entire insurance enterprise

Specific behaviour of assets and liabilities can be actuarially modelled for increased accuracy

Multiple scenarios, stochastic scenarios and stress testing can enhance the quality of the output of the model



Source: Guy Carpenter & Company, LLC





# An Actuary's "Tools"

An actuary uses a number of "tools" in performing the actuarial function:

- Actuarial skills
- Specialized software
- Internally developed models
- Data

# Data

Data is information that can be used to identify a pattern, a trend, a behaviour that can form the basis for an actuarial model and / or one or more of the parameters and assumptions of the model

Data is everything to an actuary

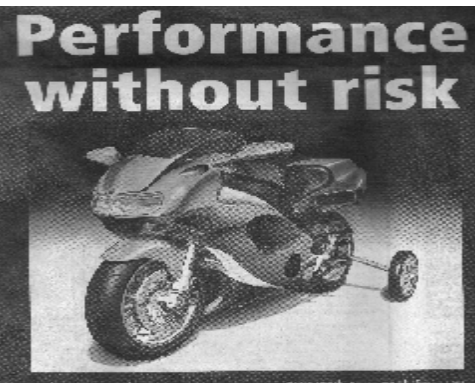
Data must be relative, of good quality and of sufficient volume and history according to the purpose for which it is needed

Actuaries spend a lot of time and effort analyzing data and must cooperate with a number of people in order to get the desirable result

# Risk Management or Actuarial Science?

**Efficiently allocate capital**

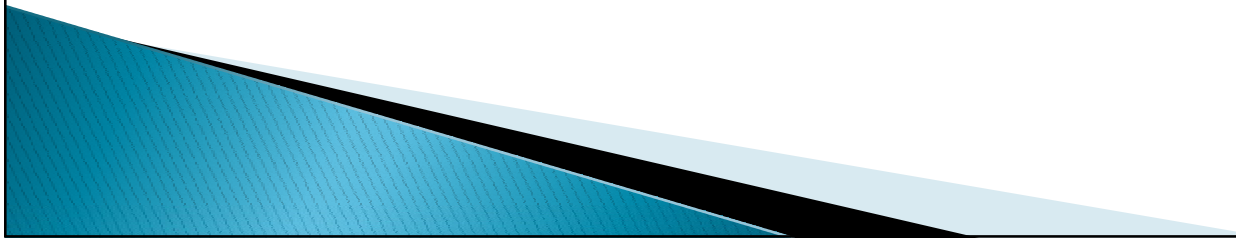
**Improve capital budgeting decisions**



**Manage effectively catastrophic risks**

**Better manage new activities (expansion plans, new territories, mergers and acquisitions, etc)**

# **Implementing a Risk Management Framework**



# We must have the basics in place first

Engaged Board of Directors

Clear Risk Management support from the top i.e. CEO driving a top down approach throughout the organization

Fully formed and functioning Risk Committee

Clearly written Risk Management policy and Governance procedures

Development with BOD of Corporate Risk Appetite Statements

# Lessons Learned from Others

Risk Management is not a “one time” project but a continuous process that needs to be:

- Embedded into both strategic and daily decision-making
- Subject to effective corporate governance
- Supported by an appropriate control environment

It can become complex - so keep it simple

Head of Risk or Chief Risk Officer has a very critical role to play as he / she must support all managers in understanding how to implement RM in their responsible areas

Experience has shown that operating managers must be responsible and held accountable for effective risk management

Risk Management works well when it is built into the fabric of the organization and executed by those with the requisite authority and responsibility for running the business

# Define your Risk Appetite

## Risk Appetite

- the amount of risk an organisation is willing to seek or accept in pursuit of its long-term objectives

## Risk Tolerance

- the boundaries of risk taking outside of which the organisation is not prepared to venture in pursuit of its long-term objectives

## Risk Universe

- the full range of risks which could impact, either positively or negatively, on the ability of the organisation to achieve its long-term objectives

**Risk Appetite helps formulate Strategy and guide actions**

# The role of Management on risk

Responsible for implementing board policies on risk and control

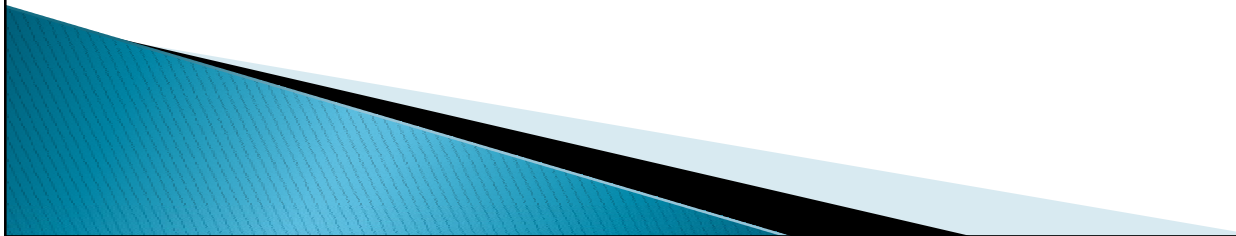
Identify and evaluate risks faced by the business for consideration by the board

Design, operate and monitor a suitable system of internal controls to manage risks within the risk appetite set by the board





# **Developing a Risk Culture**



# Developing a Risk Culture

Culture is developed  
and not enforced

Do not impose on staff  
a certain "Risk culture"

Culture development  
takes time and must be  
gradual

Everyone has a role to  
play in the process

Risk management and  
compliance are  
everyone's  
responsibility

Try to embed a culture  
that views good risk  
management and  
compliance as being  
good business practice



# Steps in Developing a Risk Culture

Get staff to involve gradually into the process with increasing level of involvement over time

Educate the Management and the Board



Workshops to better understand Risk Management and their role in the process

Involve the staff in the risk definition process and the completion of the Risk Definition Templates

# Steps in Developing a Risk Culture

**Hold risk management discussions in all departmental and management meetings**

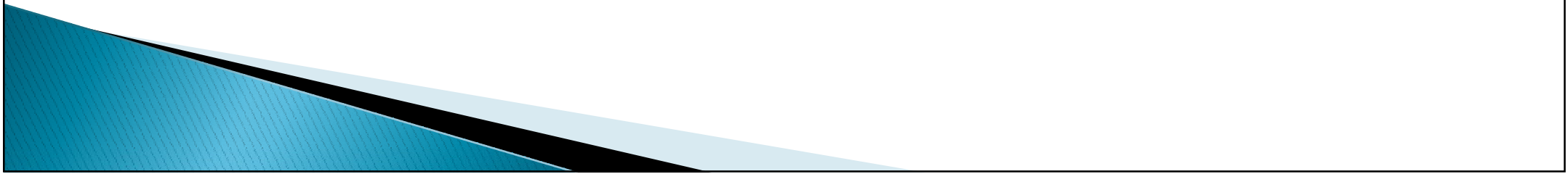
**Introducing risk management capabilities as an additional staff performance appraisal criterion**

**Build a dynamic Risk Register that can be viewed by staff as their own development**

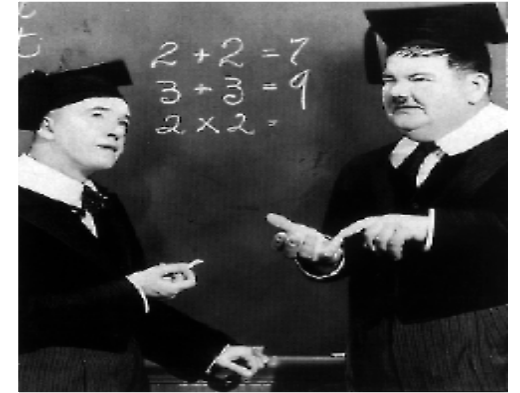
**Regularly communicating the risk management program to management and staff so that it is visible**

**Foster an environment in which staff and management are encouraged to identify and manage risk**

# **Risk Management Challenges**



# Risk Management Challenges



Embedding the risk management culture

Obtaining **buy-in** from the board, senior management, business unit management and all staff

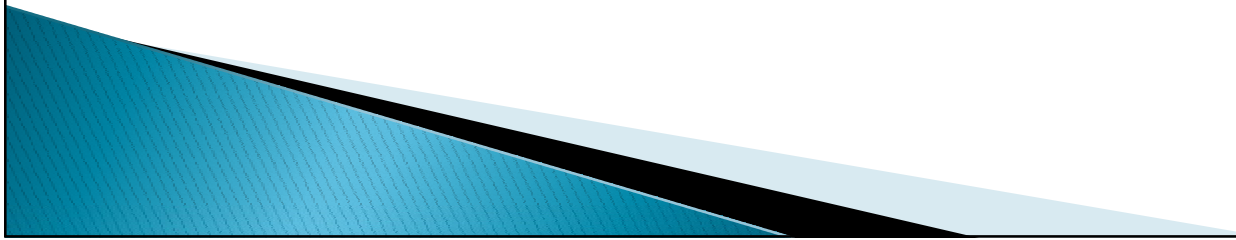
Ensuring **widespread understanding** and the involvement of all business units

Ensuring **consistent risk profiling** and risk management reporting

Adhering to **continuously changing** regulatory environments

Acknowledging that we are managing risks in a **dynamic and uncertain world**

# **Enterprise Risk Management - ERM**



# What is Enterprise Risk Management

## CAS Definition of ERM

- The process by which an organization:
- Assesses
- Controls
- Exploits
- Finances
- Monitors

risks from all sources for the purpose of increasing the organization's short and long term value to its stakeholders.

## Enterprise Risk Management (ERM) seeks to:

- include all categories of risk and uncertainty
- consider upside as well as downside
- be comprehensive – applied throughout the organization
- Break down barriers and silo mentality



# Why the need for ERM?

Sustain competitive advantage

Expand or improve corporate governance

Better understand risks from all sources and their interdependencies

Eliminate unnecessary controls and improve on existing controls

Improve risk management capabilities

# ERM – A Long Journey

ERM is a multi year journey requiring ongoing assessment of:

- Where are we now and where are we going in the future?
- Are we staying ahead of evolving legal, regulatory corporate governance changes?
- What approach is most appropriate for my company's risk profile and culture?
- What practical tools and methods can we use to extract tangible value?



**QUESTIONS**  
And  
**Answers**