PLANNING AND BUILDING AN ERM PROGRAM

Based on Global Best Practices

October 2010
Planning and building an ERM program

Goal: a better understanding of the following:

1. Building an ERM Program
2. Choosing ERM Objectives
3. Identifying Risks & Heat Mapping
4. 20 Global Best practices in ERM
5. ERM Fundamental Practices
6. Emerging Risks and Stress Testing
BUILDING FULL ERM PROGRAM
Building an ERM Program

Phase I – Assessment
Phase II – Best Practices
Phase III – Support
Phase IV – Communication
Phase V – Reinforcement
Phase I - Assessment

- Primary Task - Identify Objectives for ERM
- Secondary Tasks
  - Build Risk Awareness
  - Identify Risks
  - Assess Risks
    - Frequency
    - Severity
  - Assess Risk Offset
  - Assess Risk Controls
  - Identify Priorities for improving controls
  - Identify Barriers
Objectives of ERM

- **Loss controlling**
  - limit exposures and therefore losses
  - ERM adds aggregate approach to risk tolerance

- **Risk trading**
  - getting paid for risks taken
  - ERM adds consistent approach to risk margins

- **Risk steering**
  - strategic choices to improve value
  - ERM adds risk vs. reward point of view

- **Diversification**
  - Choosing different risks
  - ERM adds quantification of benefits of non-correlating risks
Four Risk Attitudes

- **CONSERVATOR.** According to this perspective, increasing profit is not as important as avoiding loss. Holders of this view often feel that the world is filled with many, many dangerous risks that they must be very careful to avoid.

- **MAXIMIZER.** This perspective does not consider risk very important – profits are important. Businesses managed according to this perspective will accept large risks, so long as they are well compensated. People who hold this perspective believe that risk is mean reverting – gains will always follow losses – and the best companies will have larger gains and smaller losses over time.

- **MANAGER.** Careful balancing of risks and rewards is the heart of this perspective. Firms that hold this view employ experts to help them find risks offering the best rewards, while at the same time managing these risks to keep the firm safe. They believe that they can balance the concerns of the first two groups, plotting a very careful course between them.

- **PRAGMATIST.** This perspective is not based on a specific theory of risk. Pragmatists do not believe that the future is very predictable – so, to the greatest extent possible, they avoid commitments and keep their options open. They do not think that strategic planning is especially valuable, but rather seek freedom to react to changing conditions.
Stages of Risk

PRICE-TO-RENT RATIO, Q1 1997 = 1.0
NATIONAL CASE-SHILLER HOME PRICE INDEX AND OWNER EQUIVALENT RENT

BOOM

MODERATE

UNCERTAIN

BUST

http://calculatedrisk.blogspot.com/
Alignment of Environment – Attitude – Strategy
**ERM development objectives**

<table>
<thead>
<tr>
<th>Risk Management Systems</th>
<th>Loss Controlling</th>
<th>Risk Trading</th>
<th>Risk Steering</th>
<th>Diversification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Management Systems</td>
<td>Strict limits</td>
<td>Flexible opportunities</td>
<td>Formal policies and standards CRO</td>
<td>Flexible</td>
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<tr>
<td></td>
<td>Strict authorities</td>
<td></td>
<td></td>
<td>High communication</td>
</tr>
<tr>
<td>Risk Models</td>
<td>Stress testing</td>
<td>Pricing models Rating agency</td>
<td>Economic capital &amp; value</td>
<td>Simplified economic capital</td>
</tr>
<tr>
<td>Risk Management Reports</td>
<td>Limit breaches Emerging risks Extreme loss</td>
<td>Profit and risk weighted sales</td>
<td>ROE Capital budget</td>
<td>Risk aggregates &amp; concentrations</td>
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</tbody>
</table>

**Focus on strengths or weaknesses?**
Risk Attitude Survey

- Take a 10 minute survey to assess your Risk Attitude
  http://tinyurl.com/riskattitude

- Willis Re eSSENCE™ Workshop
  - Explore the implications of Risk Attitude with
    - Risk Management Team
    - Management Risk Oversight Committee
    - Top Management Group
    - Board Risk Committee
    - Full Board
Building an ERM Program

**Phase I - Assessment**
- Primary Task - Identify Objectives for ERM
- Secondary Tasks
  - Identify Risks
  - Assess Risks
    - Frequency
    - Severity
  - Assess Risk Offset
  - Assess Risk Controls
  - Identify Priorities for improving controls
  - Identify Barriers
  - Build Risk Awareness
Key Risks & Controls
Process Self Assessment

Five Steps

• Risk Identification
• Risk Assessment
• Risk Control Assessment
• Heat Map Development
• Risk Plan
Which are your risks?

A List of Risks Facing Insurers
(compiled by Dave Babbel, Wharton School)

CORPORATE
- Capital Utilization
- Expense Control, Overhead Burden
- Regulatory Compliance
- Ethics & Employee Behavior
- Accountability
- Meritocracy
- Quality of Management
- Quality of Training
- Quality of Workforce, Service
- Management Succession
- Recruitment/Renewal
- Industry Reputation
- Industry Concentration
- Company Reputation
- Teamwork Over Turf
- Coping With Change
- Technological Breakdown
- Nontraditional Ventures
- Guaranty Fund Assessments
- Tax Law Changes
- Uninsured Pure Firm Losses
- Information Systems Problems
- Legal Risk
- Financial Disclosure Risk

LIABILITY SIDE
- Pricing
- Pricing Adequacy
- Expense Margin
- Unrealistic Competition
- Policy Lapses
- Long Tail of Liabilities
- Inflation Risk
- Adverse
- Mortality
- Morbidity
- Longevity
- Subsidized Early Retirement
- Disintermediation
- Secular Trend
- Utilization of Covariates
- Antiselection
- Natural Catastrophes
- Moral Hazard
- Fraudulent Information
- Fraudulent Claims
- More Hazard
- Product Development
- Product Design
- Product Appeal
- Consumer Misunderstandings
- Distribution
- Cost of Distribution
- Agent Recruitment
- Agent Productivity
- Agent Retention
- Policy Churning
- Regulatory Environment
- Compliance
- Loss of Tax Benefits
- Health Care Reform
- Other Regulatory Changes
- Financial Reporting
- Surplus Stress
- GAAP for Mutuals
- FAS 115
- Unsound Reporting
- Mark-to-Market Risk
- Reputation
- Ethics & Compliance
- Quality of Service
- Corporate Image
- Market
- Uncontrolled Growth
- Unlisted Markets
- Market Saturation
- Bank Competition
- Globalization
- Liability Insurance
- Political & Currency
- Foreign Exchange Risk of Claims
- Profile Repatriation
- Political Risk
- Terrorism
- Surplus
- Capital Adequacy
- Funding Risk

ASSET SIDE
- Credit
  - Public Bonds
  - Private Placements
  - Mortgages
  - Collateral Risk
  - Counterparty Risk
  - Reinsurance Insolvency
- Systematic Risks: Interest Rate Risk
- Call Risk - Callable Bonds
- Prepayment Risk - MBS & CMO
- Duration, Convexity, Drift
- Change in Interest Volatility
- Yield Curve Shape, Twist
- Systematic Risks: Other
- Equity Market Risk
- Basis Risk
- Inflation Risk
- Liquidity
  - Cash Mismatch
  - Disintermediation
  - Run on the "Bank"
- Maturity Extension
- Mortgage Refinancing
- Loss of Equity Value
- Real Estate Stocks
- Subordinated Derivatives
- Diversification
- Asset Allocation
- Industry and Geographical Risk
- Unstable Covariances Risk
- Political & Currency
  - International Investments
  - Foreign Exchange Risk
  - Terrorism

ERM
- Too Broad
- Too Narrow
Risk Assessment

- How Significant are your risks?
- Subjective Assessment
- Consensus view
- Frequency / Severity
- Rank largest
Risk Prioritization

Level 1 – For Board & Top Management

Level 2 – For Middle Management

Level 3 – For Supervisors
Risk Prioritization
Level 1 Risks

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10.

Actionable
Top Management Focus
Take to Board
Take to Rating Agency
Risk Control Assessment

- For Most Significant Risks
- How *effective* are your existing control processes?
- For the best controlled risks, how much risk is left after the control process? Are they still significant?
- Subjective Assessment
- Not as easy to reach consensus
Heat Map Development

Risk Control Self Assessment

Risk & Control Heat Map

Risk Significance

Large
Medium
Small

More Effective Control
Less Effective Control

Low Priority
Moderate Priority
High Priority
Choose High Priority Risks (In the Red) to address this year

Plan will be to:

- Prepare detailed documentation of existing control processes
- Research and identify best practice control processes
- Compare existing to best practice
- Choose improvements to make
- Implement improvements
Building an ERM Program

Phase I - Assessment

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  - Identify Priorities for improving controls
  - Identify Barriers
  - Build Risk Awareness
Building an ERM Program

Phase II – Best Practices

• Assess Existing Risk Management practices compared to Best Practices
  • All Insurers have long established risk management practices
• Each Company will need to choose which Best Practices they will emphasize
  • Include some already in practice
  • Some that can be implemented easily
  • Some difficult but important goals
• Make Choices based on Assessment and Goals for ERM
20 ERM BEST PRACTICES

Risk Identification
Risk Language
Risk Measurement
ERM Policies and Standards
Risk Organization
Risk Limits
Risk Management Culture
Risk Learning
Measurement Validation
Risk Diagnosis

Stress Testing
Risk Capital
Risk Reporting
Risk Disclosure
Risk Management Governance
Risk Optimization
Risk-Adjusted Performance Measurement
Risk-Adjusted Compensation
Action Orientation
Change Risk
Phase III – Support

- Risk Management must have Board & Broad Top Management support to develop Culture
  - Clear Champion of ERM among Top Management & Board
  - Clearly identified Objectives for ERM
- Support must take the form of
  - Budget
  - Priority
  - Access
  - Authority
- Public Statements of Support
Building an ERM Program

Phase IV – Communications

- Transparency - Major Component of Risk Management
  - Means that everyone can see what is happening
- Risk Reports – Broadly available
- Successes & Failures are disclosed and discussed
Phase V – Reinforcement

- ERM is Not “Once and Done”
- Top management & Board need to understand this at the outset
- Must continually feed the culture
  - incorporate new employees
  - provide training & growth for existing employees
- Periodically revisit
  - Assessment Phase
  - Best Practices Phase
- Occasionally Revise or Reaffirm Risk Management Objectives
ERM best practices

- Fundamentals: 8
- Risk Measurement: 4
- Risk Communication & Governance: 3
- Risk Steering: 5

Willis Re MANAGING EXTREMES
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*Eージェイエム: ERM BEST PRACTICES*
1. **Risk Identification**: Systematic identification of principal risks
   - Identify and classify risks to which the firm is exposed and understand the important characteristics of the key risks

2. **Risk Language**: Explicit firm-wide words for risk
   - A risk definition that can be applied to all exposures, that helps to clarify the range of size of potential loss that is of concern to management and that identifies the likelihood range of potential losses that is of concern. Common definitions of the usual terms used to describe risk management roles and activities.

3. **Risk Measurement**: What gets measured gets managed
   - Includes: Gathering data, risk models, multiple views of risk and standards for data and models.
4. **Policies and Standards:** Clear and comprehensive documentation
   - Clearly documented the firm's policies and standards regarding how the firm will take risks and how and when the firm will look to offset, transfer or retain risks. Definitions of risk-taking authorities; definitions of risks to be always avoided; underlying approach to risk management; measurement of risk; validation of risk models; approach to best practice standards.

5. **Risk Organization:** Roles & responsibilities
   - Coordination of ERM through: High-level risk committees; risk owners; Chief Risk Officer; corporate risk department; business unit management; business unit staff; internal audit. Assignment of responsibility, authority and expectations.

6. **Risk Limits and Controlling:** Set, track, enforce
   - Comprehensively clarifying expectations and limits regarding authority, concentration, size, quality; a distribution of risk targets and limits, as well as plans for resolution of limit breaches and consequences of those breaches.
7. Risk Management Culture: ERM & the staff
   - ERM can be much more effective if there is risk awareness throughout the firm. This is accomplished via a multi-stage training program, targeting universal understanding of how the firm is addressing risk management best practices.

8. Risk Learning: Commitment to constant improvement
   - A learning and improvement environment that encourages staff to make improvements to company practices based on unfavorable and favorable experiences with risk management and losses, both within the firm and from outside the firm.
9. Measurement Validation: Keeping measurements useful

- Utilize professionals with relevant expertise to confirm that risk measurement procedures are consistent with industry best practices and a challenge process to assure that measurement reflects real risk that is always changing.

10. Risk Diagnosis: Identify underlying causes of changes in risk exposures.

- Examination of the relationship between the emerging experience of the firm in the areas of risk exposures. Root Cause analysis. Implication identification. Action steps to improve risk models and risk management practices.
11. **Stress Testing:** Preparing for unknown unknowns

- Develop detailed "what if" scenarios. Perform testing of impact of scenarios on firm. Identify and track key risk indicators, prepare contingency plans, perform mock event drills, develop potential risk mitigation tactics.

12. **Risk Capital:** Capital needs and capital usage

- Starts with a definition of Risk Capital Target and relationship with solvency standard. Includes the determination and update of risk capital target value; allocation of risk capital; capital budgeting process and the use of capital alternatives.
13. **Risk Reporting:** To senior management and the board of directors
   - Reporting of risk profile incorporating risk quantity and quality, time view, likelihood, uncertainty that is frequent and consistent.

14. **Risk Disclosure:** Actively inform constituencies of risks, measurement and management
   - Disclosure of risks; risk measurement techniques and findings; risk management programs and expectations; risk capital; Franchise Value determination to rating agencies, regulators, investors.

15. **Risk Management Governance:** ERM and the Board
   - Regular discussions with the board regarding risks and risk management. Board approves plans for the quantity & quality of risk. Board actively consulted regarding changes to major risks from management action or external factors and proposed response to those changes. Board approves Policies and Standards; Board is informed when policies and standards are violated.
16. **Risk Optimization**: Choosing options that enhance a firm's franchise value

- Periodic evaluation of alternatives and the impact on franchise value and earnings from a strategic and tactical perspective to meet business and risk management objectives culminating in identification of potential actions that produce best risk reward trade-off as well as a process for using the risk reward information in the decision making.

17. **Risk-Adjusted Performance Measurement**: Realistic and up-to-date risk assessments

- Plan and actual performance with variance analysis; risk adjustments that are realistic and flexible, process for updating risks and risk measures as needed

18. **Risk-Adjusted Compensation**: Compensation tied to risk-adjusted performance

- Incentive to increase long term value; to avoid excess risk accumulations and to get the risk measurement right.
19. **Action Orientation**: Implementation

- Risk management driving activity, not just producing reports and meetings. Uses of cost and benefit for changing risk profile; consistent risk margins for rates and pricing; making transfer, offset and retain choices; use of reinsurance, capital markets & hedging. Action orientation in changing risk environment. Risk Input on level & makeup of capital.

20. **Change Risk**: Preparing for Upside and downside of change

- Applies to new projects, products, investments, acquisitions, joint ventures, territories, markets, etc. that includes review of the Impact on Risk profile; value; risk reward and includes the determination of the application of ERM Best Practices to the new activity.
ERM FUNDAMENTALS

- Risk Identification
- Risk Language
- Risk Measurement
- ERM Policies and Standards
- Risk Organization
- Risk Limits
- Risk Management Culture
- Risk Learning
Risk Identification:

Systematic identification principal risks

- Two Common Methods:
  - Top Down
  - Bottom Up
## Risk Identification:

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Top Down</th>
<th>Bottom Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; Takes One Day</td>
<td>&gt; Likely to Capture all risks</td>
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<tr>
<td>&gt; Top Management Buy In</td>
<td>&gt; Sometimes Middle Management buy in</td>
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<tr>
<td>&gt; Results in something that is at the right level of detail for top management &amp; Board</td>
<td>&gt; May be at an actionable level for middle management</td>
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<th>Disadvantages</th>
<th>Top Down</th>
<th>Bottom Up</th>
</tr>
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<tr>
<td>&gt; Requires One Day of Top Management Attention</td>
<td>&gt; Takes a Full Year</td>
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<tr>
<td>&gt; Might Miss Something</td>
<td>&gt; Might not be accepted by Top Management</td>
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<tr>
<td>&gt; Middle Management might not buy in</td>
<td>&gt; Requires plenty of staff time to summarize for Top Management &amp; Board</td>
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</tbody>
</table>
Top Down Key Risks & Controls Workshop

- Risk Identification
- Risk Assessment
- Risk Control Assessment
- Heat Map Development
- Risk Plan
### Risk Identification

#### Which are your risks?

<table>
<thead>
<tr>
<th>Corporate Liability Side</th>
<th>Liability Side</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Utilization</td>
<td>Pricing</td>
</tr>
<tr>
<td>Expense Control, Overhead Burden</td>
<td>Pricing Adequacy</td>
</tr>
<tr>
<td>Regulatory Compliance</td>
<td>Expense Margin</td>
</tr>
<tr>
<td>Ethics &amp; Employee Behavior</td>
<td>Unrealistic Competition</td>
</tr>
<tr>
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<td>Policy Lapses</td>
</tr>
<tr>
<td>Meritocracy</td>
<td>Long Tail of Liabilities</td>
</tr>
<tr>
<td>Quality of Management</td>
<td>Inflation Risk</td>
</tr>
<tr>
<td>Quality of Training</td>
<td>Activism</td>
</tr>
<tr>
<td>Quality of Workforce, Service</td>
<td>Morality</td>
</tr>
<tr>
<td>Management Succession</td>
<td>Longevity</td>
</tr>
<tr>
<td>Recruitment/Retention</td>
<td>Subsidized Early Retirement</td>
</tr>
<tr>
<td>Industry Reputation</td>
<td>Disintermediation</td>
</tr>
<tr>
<td>Industry Concentration</td>
<td>Secular Trend</td>
</tr>
<tr>
<td>Company Reputation</td>
<td>Utilization of Covenants</td>
</tr>
<tr>
<td>Teamwork Over Turf</td>
<td>Antiselection</td>
</tr>
<tr>
<td>Coping With Change</td>
<td>Natural Catastrophe</td>
</tr>
<tr>
<td>Technological Breakdown</td>
<td>Moral Hazard</td>
</tr>
<tr>
<td>Nontraditional Ventures</td>
<td>Fraudulent Information</td>
</tr>
<tr>
<td>Guaranty Fund Assessments</td>
<td>Fraudulent Claims</td>
</tr>
<tr>
<td>Tax Law Changes</td>
<td>Morale Hazard</td>
</tr>
<tr>
<td>Unrealized Pure Firm Losses</td>
<td>Product Development</td>
</tr>
<tr>
<td>Information Systems Problems</td>
<td>Product Design</td>
</tr>
<tr>
<td>Legal Risk</td>
<td>Consumer Misunderstandings</td>
</tr>
<tr>
<td>Financial Disclosure Risk</td>
<td>Distribution</td>
</tr>
<tr>
<td>ASSET SIDE</td>
<td>Cost of Distribution</td>
</tr>
<tr>
<td>Credit</td>
<td>Agent Recruitment</td>
</tr>
<tr>
<td>Public Bonds</td>
<td>Agent Productivity</td>
</tr>
<tr>
<td>Private Placements</td>
<td>Agent Retention</td>
</tr>
<tr>
<td>Mortgages</td>
<td>Policy Churning</td>
</tr>
<tr>
<td>Collateral Risk</td>
<td>Regulatory Environment</td>
</tr>
<tr>
<td>Counterparty Risk</td>
<td>Compliance</td>
</tr>
<tr>
<td>Reinsurance Ineffectiveness</td>
<td>Loss of Tax Benefits</td>
</tr>
<tr>
<td>Systematic Risks: Interest Rate Risk</td>
<td>Health Care Reform</td>
</tr>
<tr>
<td>Call Risk - Callable Bonds</td>
<td>Other Regulatory Changes</td>
</tr>
<tr>
<td>Prepayment Risk - MBS &amp; CMO</td>
<td>Financial Reporting</td>
</tr>
<tr>
<td>Duration, Convexity, Drill</td>
<td>Surplus Stain</td>
</tr>
<tr>
<td>Change in Interest Volatility</td>
<td>GAAP for Mutuals</td>
</tr>
<tr>
<td>Yield Curve Shape, Tweak</td>
<td>FAS 115</td>
</tr>
<tr>
<td>Systematic Risks: Other</td>
<td>Unaudited Reporting</td>
</tr>
<tr>
<td>Equity Market Risk</td>
<td>Mark-to-Market Risk</td>
</tr>
<tr>
<td>Basis Risk</td>
<td>Reputation</td>
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<tr>
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<td>Ethos &amp; Compliance</td>
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<tr>
<td>Liquidity</td>
<td>Quality of Service</td>
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<td>Corporate Image</td>
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<tr>
<td>Liquidity Risk</td>
<td>Uncontrolled Growth</td>
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<td>Operational Risk</td>
<td>Unlisted Markets</td>
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<td>Market Saturation</td>
</tr>
<tr>
<td>Group Risk</td>
<td>Bank Competition</td>
</tr>
<tr>
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<tr>
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<tr>
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- Too Narrow
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- Surplus
- Capital Adequacy
- Funding Risk

### Corporate Liability Side

- Capital Utilization
- Expense Control, Overhead Burden
- Regulatory Compliance
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### Asset Side

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- How Significant are your risks?
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Risk Control Assessment

- For Most Significant Risks
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- Not as easy to reach consensus
Heat Map Development

Risk Control Self Assessment

Risk & Control Heat Map

- More Effective Control
- Less Effective Control

- Low Priority
- Moderate Priority
- High Priority
Risk Control Plan

Choose High Priority Risks to address this year

- Plan will be to:
  - Prepare detailed documentation of existing control processes
  - Research and identify best practice control processes
  - Compare existing to best practice
  - Choose improvements to make
  - Implement improvements
2.1 Risk Identification

RISK TAXONOMY

Debt holders
Rating Agencies
Regulators

Risk vs.
Capital

Operational
Risk

Risk vs.
Volatility

Investment
Risk

Risk vs.
Return

Shareholders
Stock Analysts

Insurance
Risk

Business
Risk

- Changes in business volumes
- Changes in margins and costs

Event
Risk

- Fraud
- Unintentional errors
- Legal risk
- Man-made shocks

Credit
Risk

- Loans
- Derivative counterparts
- Reinsurance counterparts
- Settlement

Market
Risk

- Equities
- Bonds
- Foreign Exchange
- Real Estate
- ALM risk
- Liquidity risk

Property &
Casualty Risks

- Claims for 'normal' events
- Losses due to catastrophes/natural disasters (e.g. earthquakes, hurricanes, floods, etc)

Life
Risks

- Life policies
- Annuities
- Health
Risk Language:

- Explicit firmwide words for risk and Risk Management
- RISK WORDS
- Start with LOSS
- What are the words for the worst thing that has happened?
  - In the past quarter?
  - In the past year?
  - Ever?
Realistic Loss Terminology

- **Good** – Company meets plans, bonuses paid
- **Adverse** – Company fails to meet plans by significant margin, no bonuses paid. May be some layoffs.
- **Terrible** – Company shows significant loss. Top management loses jobs
- **Horrible** – Company suffers large loss. Downgraded (or other bad publicity) causes company to lose ability to sell new business
- **Disaster** – Company loses almost all surplus. Taken over by regulators

*Substitute your own words*
Risk Terminology

- Frequency & Severity

- Does “High Severity” mean the same thing in different departments?

- Do different departments have similar time frames in mind?
What is it called when someone doing risk management?

- Risk Treatment
- Risk Mitigation
- Underwriting
- Hedging
- ALM
- Quality Control
Make a List

- Of Risk & Risk Management words that are used today that are NOT part of company vocabulary
- And another list of words that are already in use

<table>
<thead>
<tr>
<th>Risk Velocity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latent Risks</td>
</tr>
<tr>
<td>Concentration Risk</td>
</tr>
<tr>
<td>Risk Complexity</td>
</tr>
<tr>
<td>Worst Case Scenario</td>
</tr>
<tr>
<td>Risk Profile</td>
</tr>
<tr>
<td>Pain Threshold</td>
</tr>
<tr>
<td>Time Frame</td>
</tr>
</tbody>
</table>
### Different Approaches Used in Banking and Insurance

<table>
<thead>
<tr>
<th></th>
<th><strong>Banking</strong></th>
<th><strong>Insurance</strong></th>
</tr>
</thead>
</table>
| **Terminology** | • Expected loss  
• Rating masterscale  
• VAR  
• RARORAC | • Claims  
• Mortality tables  
• Fair Value  
• Embedded Value/Risk Based Capital |
| **Focus**   | • Risk  
• One-year | • Expected outcome  
• Multiyear |
| **Weaknesses** | • Insufficient use of statistics  
• Customer behavior | • Insufficient use of modern finance theory (in some countries)  
• Little use of transfer pricing (ALM) |
Risk Measurement:

- What gets measured gets managed
- Includes: Gathering data, risk models, multiple views of risk and standards for data and models.
How to measure risk: quiz

- The table at right shows four alternatives, A through D, and the payoffs for each, with their associated probabilities.
- All four alternatives have the same Expected Value (EV): 100
- A positive number means that you receive this amount.
- A negative number means that you pay or lose this amount.
- Which alternative is the most risky? (Vote)
- Which is the least risky? (Vote)

<table>
<thead>
<tr>
<th></th>
<th>Probability</th>
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<th>EV</th>
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<tbody>
<tr>
<td></td>
<td>50%</td>
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</table>
How to measure risk

- Alternative A has the highest standard deviation
- But this is due to the high upside potential of this alternative. Is that really relevant?
- Does giving you a lottery ticket increase your risk?
- Isn’t risk better defined as a potential for loss?

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<tr>
<th>Alternative</th>
<th>Probability</th>
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</table>
How to measure risk

- Alternative B has the highest probability of loss.

- But the loss isn’t very big.

- Shouldn’t the magnitude of the loss also be taken into account?

<table>
<thead>
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<th>Probability</th>
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</table>
How to measure risk

- Alternative C has the highest expected loss, given that a loss occurs: \(-50 \times 0.49 = -24.5\)

- That is the breakeven cost of buying insurance against loss.

- That is also the cost of a put option with a strike price of zero.

<table>
<thead>
<tr>
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</table>
How to measure risk

- Alternative D has the **highest loss**.

- It has the **worst case loss** among the outcomes shown.

- This is the same as the **highest 1% Value at Risk (VaR)**

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</table>
Risks in the light shrink, Risks in the dark grow

- Return for Risks in the light shrinks faster than the Risk
- Return for Risks in the dark does not grow as fast as Risk

*Each of those answers was valid.*

*Each view of risk is important.*
Risk Measurement – Minimal Practice

- Do not have needed data readily available
- Models for some risks
- Only one measure of risks where there are any
- May be calculating something that is slightly or significantly different from risk definition
Adequate Risk Measures

- Information is not too late to drive any action
- Gives broad indication of the amount of risk – mostly reflecting differences to volumes
- Inexpensive
- May be understood by primary users and misunderstood by occasional users
Good Risk Measure

1. Timely
2. Accurately distinguishes broad degrees of riskiness within the broad risk class
3. Not too expensive or time intensive to produce
4. Understood by all who must use
5. Actionable
Excellent Risk Measure

Good Risk Measure Plus

6. Can help to identify changes to risk quality

7. Provides information that is consistent across different Broad Classes of Risk

8. For most sensitive risks will pinpoint variations in risk levels
Best Practices Risk Measurement

- Gathering data for risk measurement is regular output of operational processes
- Risk Models exist and are used for every risk
- Multiple views of risk are developed
- Risk Measurements are consistent with Risk definitions & Risk Language
- Clear standards for Data, Models and measures of risk
Improving Risk Measurement

- Identify existing risk measures
- Classify as Adequate, Good, Excellent
- Look to create additional risk measures where needed
- Look to improve quality of measures where needed
## Risk Measure Assessment Chart

<table>
<thead>
<tr>
<th>RISK</th>
<th>Measure</th>
<th>Quality</th>
<th>Keep, Improve, Add?</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
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<td>2.</td>
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</table>
Risk Management Policies and Standards:

Clearly document the firm's policies and standards regarding

- What Risks the firm will take
- How and when the firm will look to offset, transfer or retain risks.
- Definitions of risk-taking authorities;
- Definitions of risks to be always avoided;
- Underlying approach to risk management;
- Measurement of risk;
- Validation of risk models;
- Approach to best practice standards.
Minimal Practice

- Some policies are fully documented. Some documentation is out of date. Everybody knows what risks to avoid without writing down.
- Middle management regularly brings proposals for new projects that are rejected because risk is unacceptable.
- Risk measures might change at any time.
- Models are often used without any documented validation.
- Best practice standards are unknown.
- No verification of risk management activities.
Risk Management Policies Case Study

• Large Diversified Company
• Risk Management is a strong fundamental cultural value
  – Operation of Risk Management System
  – Review of new initiatives
  – Care & Feeding of RM Culture
Operation of RM System

- A system of limits and flags
  - Limits – for credit, market and insurance risk for each company
    - Timely measurement of exposures
    - Actual vs. Limit reports are widely distributed
    - Limits roll-up company and corporate org chart
      - Every manager up the line has limits
    - Limits are re-evaluated every year based on financial results, prior period limits and flags
Limits and Flags

- Flags
  - Include annual evaluation of macro risks of each business
    - Regulatory Risk
    - Political Risk
    - Credit, Market and Underwriting risk
  - Portfolio Quality Analysis
  - Business Performance

- Annual review of Flags
  - Renewal/update of Limits
Review of New Initiatives

• 10 step process
  — Several go-no go checkpoints
    • Including review of proposals for
      – Risk Measurement
      – Risk Limits
      – Risk Mgt – Hedging, Reinsurance, etc.
  — Risk Management needs to be detailed before significant developmental resources are committed
  — Review Committee consists of
    • Chief Actuary
    • Chief Risk Officer (May be Chief Actuary)
    • CFO
    • Chief Marketing Officer
Care & Feeding of RM Culture

• Installing RM process is a major part of any acquisition
  – 90 day transition process

• Risk Officer position established in every business unit
  – Expectations of Risk Officer are uniform across firm

• Risk Officers are provided with tools to comply with corporate requirements
  – Intranet website contains full sets of templates and actual reports
  – Global Risk Officer meetings
• The goal in managing risk is to strategically optimize risk taking and risk management to support long-term revenue and earnings growth, and shareholder value growth.
  — Seek to achieve this by capitalizing on business opportunities that are aligned with the Company’s risk taking philosophy, risk appetite and return expectations,
  — by identifying, monitoring and measuring all key risks taken, and
  — by proactively executing effective risk control and mitigation programs.
• Risks will only be assumed that are
  — prudent in relation to the Company’s capital strength and earnings capacity,
  — are aligned with our operational capabilities,
  — meet our corporate ethical standards,
  — allow us to remain diversified across risk categories, businesses and geographies, and
  — for which we expect to be appropriately compensated.
To ensure consistency, these strategies incorporate policies and standards of practice that are aligned with those within the enterprise risk management framework, covering:

- Assignment of risk management accountabilities across the organization;
- Delegation of authorities related to risk taking activities;
- Philosophy related to assuming risks;
- Establishment of specific risk limits;
- Identification, measurement, monitoring, and reporting of risks; and
- Activities related to risk control and mitigation.
Potential Topics for Policies & Standards

- Risk Identification: systematic identification principal risks
- Risk Language: explicit firmwide words for risk and Risk Management
- Risk Measurement: What gets measured gets managed
- Risk Management Policies and Standards: Clear and comprehensive documentation
- Risk Organization: Roles & Responsibilities
- Risk Limits: Set, track, enforce
- Risk Management Culture: ERM & the staff
- Risk Learning: Commitment to constant improvement
Basic Elements of Policies & Standards

- Who, What policy applies to
- Who approved policy, when effective
- Actions and communications required
- Actions prohibited
- Who has authority to grant exceptions to policy, modify policy
- Consequences of violation of policy
SAMPLE

Insurance Risk Management Policy Statement

Policy 1: The board of directors in the insurer will approve insurance risk management policies and procedures, and will be informed regularly of the insurance risk exposure of the insurer.

Policy 2: Senior management must ensure that the structure of the insurer's business and the level of insurance risk it assumes are effectively managed, that appropriate policies and procedures are established to control and limit these risks, and that resources are available for evaluating and controlling insurance risk.

Policy 3: Management will clearly defined personnel with the duties to report risk exposures directly to senior management and the board of directors.

Policy 4: Management is responsible that the insurers’ insurance risk policies and procedures will be clearly defined and consistent with the nature and complexity of the activities of the insurer. These policies will address the insurer’s exposures on a consolidated basis and also at the level of individual affiliates.

Policy 5: Management will identify the risks inherent in new products and activities and ensure these are subject to adequate procedures and controls before being introduced or undertaken. Major new risk management initiatives will be approved in advance by the board.

Policy 6: Management will ensure that the insurer has insurance risk measurement systems that capture all material sources of insurance risk and that assess the effect of insurance risk changes in ways which are consistent with the scope of insurer activities. The assumptions underlying the system will be clearly understood by risk managers and insurer management. Management will be responsible to ensure that the insurer the systems for monitoring and reporting insurance exposures to senior management and boards of directors can provide that information on a timely basis.

Policy 7: Management will establish and enforce operating limits and other practices that maintain exposures within levels consistent with overall risk management policies.

Policy 8: Management will measure their vulnerability to loss under stressful conditions - including the breakdown of key assumptions - and consider those results when establishing and reviewing their policies and limits for insurance risk.

Policy 9: Management will ensure that the insurer has adequate internal controls for the insurance risk management process and will evaluate the adequacy and integrity of those controls periodically. Individuals responsible for evaluating control procedures will be independent of the function they are assigned to review. Management will periodically engage an independent reviewer to conduct an independent review of the adequacy and integrity of their risk management processes. Such reviews will be presented directly to the board.

Policy 10: Management will make appropriate disclosures of the level and quality of the risks of the insurer as well as of the risk management systems that are being used by the insurer to the broadest extent that will not otherwise harm the insurer.
Risk Organization:

Roles & Responsibilities

- Coordination of ERM through: High-level risk committees; risk owners; Chief Risk Officer; corporate risk department; business unit management; business unit staff; internal audit. Assignment of responsibility, authority and expectations.
Risk Management Organization
Board & Top Management
Risk Management Responsibilities

- Supporting Risk Management
  - Decisions, Actions, Incentives, Access
- Establishing Risk Mgt Organization
- Specifying:
  - Loss Tolerance
  - Earnings Volatility Tolerance
  - Capital Target
  - Rating Target
Supporting Risk Mgt

• Decisions
  — Insisting on Risk information before making decisions
  — Using Risk information to influence decisions

• Actions
  — Backing enforcement of Risk Mgt policy violations

• Incentives
  — Including risk mgt criteria in incentives
  — Eliminating incentives that directly work against risk management
Establishing Risk Mgt Organization

- Board Risk Committee
- Corporate CRO position
- Corporate Risk Mgt Committee
- Sufficient Staff
  - Number of people
  - Training
Chief Risk Officer
Chief Risk Officer
Chief Risk Officer
Chief Risk Officer
Chief Risk Officer
Chief Risk Officer

- Provides Leadership and Vision for ERM
- Acts as point person in establishing integrated ERM
- Champion of Intelligent Risk Management
  - Balance of Caution & Encouragement
Chief Risk Officer

Responsible for

- Risk Policy
- Risk Analytics and Reporting
- Business Unit CRO’s
- Communication

Member of:
- Capital Management Committee

Leader of:
- Risk Management Committee
CRO Staff

- Head of Credit Risk Mgt
- Head of Market Risk Mgt
- Head of Insurance Risk Mgt
- Head of Operational Risk Mgt
  - Insurance Manager
Risk Management Committee

- Members
  - Chief Financial Officer
  - Chief Investment Officer
  - Chief Actuary
  - Internal Auditor
  - Chief Risk Officer
  - Chief Operating Officer

- Members (possible)
  - Chief Marketing Officer
  - Chief Service Officer
  - Chief Counsel
  - Chief Underwriter
  - Chief Information Officer
Risk Oversight Committee Responsibilities

- Review & approve risk policy
- Oversee enforcement
- Ensure RM objectives are met
- Review & approve RM Strategies of business units
- Periodic review of RM programs
  - especially focusing on impact of environmental changes on impact and effectiveness of programs
- Review of new products & programs

CCRO White Paper
Risk Oversight Committee Responsibilities

• Set & enforce requirements for regular risk reporting
• Periodic independent review of risk management
• Review models used to evaluate risks
Risk Oversight Committee

- Transforms Board & Senior Management Preferences into specific, actionable, clear, measurable standards
- Monitoring of compliance with standards
- Enforcement of consequences for violations of standards
Risk Reporting

- P&L from risks
- Current exposure
  - Aggregate
  - By type
  - Largest exposures
- Limit utilization
- Record & status of exceptions
RISK MANAGEMENT
ORGANIZATION EXAMPLES

Willis Re
MANAGING EXTREMES
A. Central (Corporate) Risk Office

headed by CRO

3 Direct Reports - Responsible for:

(1) operational risk management & corp ins programs
(2) risk assessment & modeling Stds
(3) Insurance risk - underwriting, mortality, morbidity & reinsurance

CRO - board mandate - open access throughout company

• access to Sr.Mgt. & Board- regularly meets alone w/head of board risk review committee
A. Board Risk Review Committee

B. Exec Risk Committee - chaired by CEO - lead by CRO
   President, CFO, Chief Counsel, Appointed Actuary, Inv Risk Management Head, Internal Auditor
   Policy Setting - Emerging issues - Monitoring special problems,

   C. Central Risk Steering Committee
      CRO, SBU Risk Officers, SBU auditors, Chief Actuary, Chief Compliance Officer, Chief Auditor
      Implementation of RM policy
What a Dedicated Risk Management Infrastructure May Look Like...

Corporate Risk Committee
Chairperson: Chief Risk Officer
- Standard & Policy setting
- Corporate risk appetite
- Escalation authority limits for Profit Center Risk Committees
- Integrated risk process - broader than financial
- Approval Review of new ventures & acquisitions
- Aggregation of risk exposures
- Consistent Profit Center application
- Trigger in-depth Audit

Chief Risk Officer

Chief Financial Officer

General Counsel

Other Corp. Officers

Profit Center 1
General Mgr

Mkt'g Mgr
Ops Mgr
Etc.
Risk Mgr

Profit Center 1 Risk Committee
Chairperson: Risk Mgr

Profit Center 2 Risk Committee
Chairperson: Risk Mgr

Profit Center 3 Risk Committee
Chairperson: Risk Mgr

- Enforces Corporate Standards & Policies for Risk Controls on all business operations
- Reviews & Approves new ventures and acquisitions within Profit Center authority limits
- Ensures on-going Risk identification, mitigation, quantification, diversification and monitoring
- Periodic comprehensive risk assessment of profit center processes and initiatives

SOA Risk Management

ERM Sub-Group
What a Company Should be Prepared to Do... A Supporting Risk Culture

<table>
<thead>
<tr>
<th>CEO &amp; Senior Mgmt</th>
<th>Chief Risk Officer</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Define Risk Objective: e.g. Prevent Surprises Negatively Impacting GAAP Income, Brand, Franchise Value, Relationship with Regulators/Customers</td>
<td>• Translation of Company Risk Objective into:</td>
</tr>
<tr>
<td>• Company-wide Risk Processes and a Supporting Risk Culture (push accountability to Leadership)</td>
<td>- Robust &amp; Integrated Risk Processes</td>
</tr>
<tr>
<td>• Active Engagement &amp; Ownership at Senior Management level</td>
<td>- Standards or Metrics of Success for Consistent Measurement of Profit Center Risk Infrastructure</td>
</tr>
<tr>
<td>• Articulate Company Risk Appetite</td>
<td>- Aggregate company-wide Risk Exposures</td>
</tr>
<tr>
<td>• Set Standards &amp; Policies including Escalation Authority Limits</td>
<td>- Understand and recommend risk mitigation strategies</td>
</tr>
<tr>
<td></td>
<td>- Reflect risk considerations in capital management activities</td>
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<td></td>
<td>- Oversight of Profit Center Risk Deployment</td>
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<tr>
<td></td>
<td>- External Communication: Rating Agencies, Regulators, Market Analysts, Investors Relations, etc.</td>
</tr>
<tr>
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<td>• Chair Corporate Risk Committee</td>
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</tbody>
</table>

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<thead>
<tr>
<th>General Mgr &amp; Local Mgmt</th>
<th>Risk Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Company-wide Risk Processes and a Supporting Risk Culture (push accountability to Leadership)</td>
<td>• Implementation of Corporate Risk Processes</td>
</tr>
<tr>
<td>• Active Engagement &amp; Ownership at Local Management level</td>
<td>• On-going Reviews &amp; Approves new ventures and acquisitions within Profit Center authority limits</td>
</tr>
<tr>
<td>• Review Risk Mgr Reports &amp; Recommendations regarding Risk Process Controls</td>
<td>• Ensures on-going Risk identification, mitigation, quantification, diversification and monitoring</td>
</tr>
<tr>
<td></td>
<td>• Periodic comprehensive risk assessment and re-evaluation of profit center processes and initiatives</td>
</tr>
<tr>
<td></td>
<td>• Chair Profit Center Risk Committee</td>
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</tbody>
</table>

SOA Risk Management

ERM Sub-Group
Risk Limits and Controlling:

- Set, track, enforce
- Control Cycle
- Bottom Up / Top Down Process

- Comprehensively clarifying expectations and limits regarding authority, concentration, size, quality; a distribution of risk targets and limits, as well as plans for resolution of limit breaches and consequences of those breaches.
Basic Control Cycle
Control Cycle Elements

- Identify Risks
- Evaluate Risks
- Monitor Risks
- Diversify Risks
- Limit, Avoid Risks & Offset Risks
- Transfer Risks
- New Product Risk & Risk Control Review
- Process Reporting
Risk Control Cycle

Identify

Monitor

Adjust

Assess

Plan

Manage
Risk Control Cycle

- Identify
- Assess
- Plan
- Manage
- Monitor
- Adjust
- Understanding **Risk Capacity** (Tolerance) and
- **Risk Appetite** (How much of Capacity will be used)

- Discussions of:
  - Peer Comparisons, RBC, Rating Agency Views, Historical
  - Loss Scenarios, Future Loss Scenarios, Economic
  - Capital, Franchise Value, Effective Risk Appetite, Risk
  - Preferences, earnings volatility, ruin
1. What have been the most successful decisions over the past 5 – 10 years?
2. What adverse experience was avoided due to management/board actions and decisions over the past 5 – 10 years?
3. What is the worst experience over the past 20 years?
4. What is the worst experience that a peer company have in the past 20 years?
5. What are the most significant risks at the current time?
6. Where does the company expect to be in relation to peers 5 or 10 years in the future?
7. What are the financial measures that are the most important to management and board?
8. Based upon those financial measures, how would management and board define a great year, a good year, a fair year, a poor year, a terrible year and a disastrous year?
9. What are the sorts of business opportunities that company
   — would never consider doing?
   — would like to be doing more of?
   — might do if the returns look to be very good?
10. How would company see itself performing in the worst of the next 20 years?
Types of Risk Appetite Statements

- **Ratings Based** – Insurer will not take risks that will endanger their rating from AM Best.
- **Risk Based Capital Based** – Insurer will maintain an RBC Ratio of at least xxx%.
- **Event Based** – Insurer will maintain capital to support a loss at least as large as experienced from Hurricane Katrina along with an investment loss like 2001.
- **Probability Based** – Insurer will maintain capital so that the probability of a loss exceeding capital is no more than 3 in 10,000 (AA S&P level).
- **Value Based** – Insurer will maintain a level of capital the produces the best franchise value for the firm with the risks taken.
- **Earnings Based** – Insurer will not take any risks that could result in the loss of earnings of more one quarter’s average earnings over the past 5 years.
- **Capital Based** – Insurer will not take risks that will produce a loss of more than 25% of capital at the 1/250 probability level.
Risks can be kept within limits by either

- Controlling the amount of GROSS risk taken to keep it within limits
  - Includes management of the terms of gross risk taken
- Using Risk Treatment techniques to make sure that NET risk retained is within limits
Risk Treatment Techniques

- Financial Market Risks
- Hedging - External/Internal
- Asset Liability Management
- Insurance Risks
- Reinsurance
- Capital Markets Instruments
Risk Management Culture:

- ERM & the staff

- ERM can be much more effective if there is risk awareness throughout the firm. This is accomplished via a multi-stage training program, targeting universal understanding of how the firm is addressing risk management best practices.
Risk Management Culture

Culture – a set of shared beliefs, goals, ways of doing things among a group of people
What is the Culture of an Insurance Company?

The Culture of a business can be thought of as the shared beliefs about the organization:

— We always do …
— We are really good at …
— We would never …
— ….. Is the most important thing around here.
Culture includes the Company line on …

- Sales
- Products
- Service
- Expense Control
- Profit
- Markets
- Compliance

- Competitors
- Financial Strength
- Company Ratings
- Participation in industry, civic, charitable & national affairs
Risk Management Culture

• Importance of
  – Financial Strength
  – Exposure to risk of insolvency
  – Exposure to earnings Volatility

• Awareness of risk and importance of risk management at all levels of the company

• Embedding risk management concepts into every business decision
  – Second nature
## Cultural Imperatives

### Expense Management Culture
- How much does it cost?
- How can we achieve the same objective at a lower cost?
- Expenses are tracked frequently and expense reports are important management tools
- If you spend over budget you will have to explain variance immediately.
- Compensation programs reward good expense management

### Risk Management Culture
- How much risk does it create?
- How can we achieve the same objective at a lower risk?
- Risks are tracked frequently and risk reports are important management tools
- If your risk exposure goes over the limit you will have to explain variance immediately.
- Compensation programs reward good risk management
Risk Learning:

- Commitment to constant improvement

- A learning and improvement environment that encourages staff to make improvements to company practices based on unfavorable and favorable experiences with risk management and losses, both within the firm and from outside the firm.
Lessons Learned Framework

- Outward
- Inward
- Forward
- Backward
Periodically revisit

- Risk Identification & Control Assessment
- Best Practices Implementation
- Loss Experiences
- Limit Violations
- Measurement Problems
- Successes
Risk Learning - Outward

What has happened to Peers?

- Successes and Failures
- Developments in Best Practices
- Enhancements to Measurement Tools

What has happened in other Businesses and Regions?

In Academia?

- How many times do companies ask their new college graduates to apply their education?
Risk Learning - Backward

- Look at historical risk management failures
  - See Introduction
- Identify historical risk management successes
- Companies who survived the major crises of the past generation
  - How did they do it?
Risk Learning - Forward

Risk Environment never stays static

- Imagine how risks might be changing
- How might the company respond to the potential changes
  - Changes to limits, measures, mitigation techniques
ERM FUNDAMENTALS

- Risk Identification: systematic identification principal risks
- Risk Language: explicit firmwide words for risk and Risk Management
- Risk Measurement: What gets measured gets managed
- Risk Management Policies and Standards: Clear and comprehensive documentation
- Risk Organization: Roles & Responsibilities
- Risk Limits and Controls: Set, track, enforce
- Risk Management Culture: ERM & the staff
- Risk Learning: Commitment to constant improvement
Stress Testing & Emerging Risks Management
Emerging Risks Management

Process for Anticipating Emerging Risks

- Development of Emerging Risk Scenarios
  
  Terrorism, Natural Disasters, Pandemic, Man-made Disasters, IT Failures, Power Failures, Stock Market Crash, Banking Crisis, Interest Rate Spike, Systemic liquidity Crisis, hyperinflation, negative interest rates, significant negative economic growth, Stagflation, Price deflation, currency exchange rate crash

Process for Envisioning Significance of Emerging Risks

- Stress Testing
  
  Stress Tests are also used to correct for shortcomings in primary risk measurement models

- Liquidity Risk Analysis
Emerging Risks Management

Process for Preparing Response to Emerging Risk Situations
  Liquidity Crisis planning
  Reputation Risk planning
  Crisis Response Rehearsal
  Contingency Planning

Execution of Company in Emerging Risk Situation
  Company learning process from Emerging Risk Situation

Environmental Scanning
  • to provide advance signals of potential Crisis developments
Stress Testing

- Types of Stress Tests
- Uses of Stress Tests
- Bank Stress Testing
- US Life Company Stress Testing
- Canadian Stress Testing

The Next set of Slides were prepared in 2003
Types of Stress Testing

- **Sensitivity Stress Testing**
  Variations in one factor
  - often for parts of the company
    i.e. What if interest rates rise 100 bps?

- **Scenario Stress Testing**
  Fully articulated economic scenario
  and/or interrelationships of factors
  Projection of total company financial impact
Types of Scenarios

- Subjective
  reflect specific problem situations
- Historical
  capture impact of real stress situations
- Stochastic
  based on rules for economies and economic factors
Uses of Stress Tests

- Understanding
- Control
- Capital
- Compliance
- Management
- Communication
Bank Stress Testing

- 2000 CGFS Survey
  - 43 Banks – 10 countries
- Banks Test IMPORTANT Risks
  - Large Exposures
  - Hedged positions
  - Event exposure

Not necessarily *likely* risks
Bank Stress Tests

- Reviewed frequently
  changed infrequently
- Four common themes
  Equity price shocks
  Interest rate jumps
  Emerging Markets
  Credit or liquidity spreads
Asymmetrical Risks

- Equity price drops
- Emerging market crash
- Increases in interest rates
- Increases in credit spreads

- Also, consider likelihood of market move in one direction
Weakness in VaR Methodology

- VaR calculations tend to be based on 250 days of market data
- Unusual scenarios
  - will not come up
  - are given too much weight
- Stress tests are used to compensate
Historical Scenarios

- 1987 Stock Market
- 1994 Bond Market
- 1998 Credit Market
- 1992 European markets
Reasons for Bank Stress Testing

Universal
- Understand Risk Profile
- Communicate to Sr. Mgt.
- Review with Risk Committee

Half or less
- Contingency Planning
- Capital Allocations
- Monitor Liquidity
Using the Stress Tests

- Look at changes over time rather than absolute results
- Keep scenarios the same
- Tests run daily, weekly, monthly, quarterly
  - Depends on test
- Interaction of markets tested by 25% of banks
Reactions to Stress Tests

- Adjust trading limits
- Stern discussion
- Trigger inquiry
Some Stress Testing has been required
  interest rate sensitivities
Beyond that practice varies
  What sensitivity tests are done
  How they are used
Subjective Tests

- General Market & Credit Risk

  some do not test non-parallel yield shifts

  none test scenario that their investment performance is different from market

  few test failure of largest exposures
Interest Rate Scenarios

1. Rates stay the same,
2. Rates increase by 50bp per year for 10 years,
3. Rates increase by 100bp per year for 5 years, and then drop by 100bp per year for 5 years,
4. Rates increase by 300bp, then stay the same,
5. Rates decrease by 50bp per year for 10 years,
6. Rates decrease by 100bp per year for 5 years, and then increase by 100bp per year for 5 years,
7. Rates decrease by 300bp, then stay the same,
Subjective Tests

- Few test mortality fluctuation or changes in mortality trends
  - some are beginning to test
- Some test lapse fluctuations
- Some test ratings downgrade or “run on the bank” scenarios
- Few test reinsurer failure
Few companies use historic scenarios
  1987 Stock Market Crash
  1991 Bond & Mortgage Credit Problems
  1918 Flu Pandemic
Stochastic Scenarios

- Interest rate sensitivity tests to augment NY 7
- General Scenario tests performed by 50%
  - 100 to 10,000 scenarios tested
  - most concentrate on 95th % loss or CTE95
  - all reflect correlations in tests
  - most enhance the tails
Uses of Stress Tests

- Understanding – all
- Control – all
  some strategic, some operational
- Capital – most
- Compliance – all
- Management – all
- Communication – all
Regulator Stress Testing

- New York Insurance Department Capital Markets Bureau
  
  Days following 9/11/01
  
  Insurance losses
  
  Capital Markets opening position
  
  Ran against their database of company financial information
  
  identified 14 companies likely to be in significantly weakened positions
Stress Testing has been a required part of the Appointed Actuary’s report for over 5 years.

Test a change in each experience factor separately and then all together.

Change factors had been prescribed have changed to discretionary.

Actuary’s Report to Board.
Scenarios

- **Base Scenario** – consistent with company business plan
  usually best estimate assumptions

- **Plausible Adverse Scenarios**
  Mortality, Morbidity, Persistency
  Cash Flow mismatch
  Asset value deterioration
  New Business
  Expense
  Reinsurance
  Gov’t and Political Action
Determine Material & Plausible Risks

- How much does a base scenario have to change to create unsatisfactory financial condition?
  inability to meet obligations
- Must report at least 3 material & plausible risk scenarios
- One company rotates which scenarios are tested
Integrated Scenarios

- Not necessary to combine two low probability plausible scenarios
- Should look at combinations of high probability material scenarios with low probability scenarios such as default of distressed security
Ripple Effects

- Interaction of assumptions should be considered
  - regulatory actions
  - policyholder actions

- Company response to adverse situation
  - information systems
  Speed and effectiveness of company response
  may look at impact with and without company reaction
Update to 2010

- Stress Tests during the Credit Bubble
- US 2009 Bank Stress Tests
- 2010 European Bank Stress Tests
Stress Tests During the Credit Bubble

• Stress Tests are all Severity with no Frequency
• Bank Management largely ignored their Stress Tests
• Considered them to be totally unrealistically pessimistic
  • Had to make them much less threatening for them to be considered credible
• Part of a general loss of influence for risk management in Banks

Lesson – During good times Risk Management will lose favor
US 2009 Bank Stress Tests

Conducted by the Federal Reserve

19 Largest Banks Tested
10 require additional Capital

Losses lurking within? U.S. weighs risk of future losses under a ‘more adverse scenario’

Total losses $599B

- Commercial real estate loans $53B
- Securities $35B
- Commercial loans $60B
- Residential mortgages $186B
- Credit card loans $82B
- Other loans and obligations $84B
- Trading $99B

Source: Federal Reserve
2010 European Bank Stress Testing

75 Banks Tested

7 require additional Capital

5 of those were Spanish Banks
UK Stress Tests

- Equity Values 20% fall
- Property Values 15% fall
- Credit Spreads 50 basis points widening
- Interest Rates 50 basis points rise or fall

Canadian Stress Testing

- Annual report of Appointed Actuary has long required stress testing

Australian Stress Testing
CIEOPS Stress Tests 2010

three scenarios on their solvency capital:

• a repeat of the 2008-2009 financial turmoil,
• a deep recession, and
• sudden inflation.

All insurers passed the test
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Next steps

• Last advice…