

## ERM Learning Objectives

### INTRODUCTION

These Learning Objectives are expressed in terms of the knowledge required of an *expert*\* in enterprise risk management (ERM).

The Learning Objectives are organized within the sequential steps of the Risk Management Process:

- *Establishing Context* – Achieving a full understanding of the present conditions in which the organization operates; this includes understanding the external context (e.g., organization/environment relationship, stakeholder communication policies), the internal context (e.g., business objectives, oversight structure, key performance indicators), and the risk management context (e.g., units covered, degree of coordination throughout organization).
- *Identifying Risks* – Documenting the conditions and events that represent material threats to the organization’s achievement of its objectives or represent areas to exploit for competitive advantage.
- *Analyzing/Quantifying Risks* – Calibrating and, wherever possible, creating probability distributions of outcomes for each material risk.
- *Integrating Risks* – Aggregating all risk distributions, reflecting correlations and portfolio effects, and expressing results in terms of impact on the organization’s key performance indicators (i.e., the “aggregate risk profile”).
- *Assessing/Prioritizing Risks* – Determining the contribution of each risk to the aggregate risk profile, and prioritizing accordingly.
- *Treating/Exploiting Risks* – Developing strategies for controlling or exploiting the various risks.
- *Monitoring and Reviewing* – Continual gauging of the risk environment and the performance of the risk management strategies.

---

\* Note: With regard to the examination syllabus through 2005, the level of knowledge need not be at the “expert” level for all subject areas. Hence, for syllabus purposes during this period, the required knowledge level should be calibrated to conform to the “Desired Depth of Knowledge” within the table on the following page, for each element of the ERM Framework.

## DESIRED DEPTH OF ERM KNOWLEDGE

<b>Key to Table Below:</b>		
<b>Code</b>	<b>Desired Knowledge Level</b>	<b>Education Implication</b>
<b>1</b>	All CAS members should be expert in this area	On exam syllabus – core subject (similar to ratemaking, reserving)
<b>2</b>	...	On exam syllabus – moderate treatment (similar to accounting)
<b>3</b>	All CAS members need to know about this area	On exam syllabus – light treatment (similar to underwriting)
<b>4</b>	...	On exam syllabus – very light introductory treatment (similar to claims)
<b>5</b>	...	Continuing Ed – annual ERM seminar (similar to CLRS)
<b>6</b>	Some CAS members should know about this area	Continuing Ed – special interest and/or limited attendance seminars (similar to M&A)
<b>7</b>	...	Continuing Ed – Special tracks/sessions within existing CAS (and non-CAS) meetings/seminars
<b>8</b>	...	Self-study/on-line courses/university courses (CAS to maintain bibliography)
<b>9</b>	Outside the scope of CAS	N/A

**Note: Any exam syllabus item (codes 1 - 4) also carries continuing education/self-study implications (codes 5 – 8); any continuing education item (codes 5 – 7) also carries self-study implications (code 8)**

<b>Depth of ERM Knowledge Within CAS Desired by 2005:</b>				
ERM Overview		<b>2</b>		
<b>Process Step</b>	<b>Risk Type</b>			
	Hazard	Financial	Operational	Strategic
Establish Context	<b>3</b>			
Identify Risks	<b>5</b>	<b>6</b>	<b>7</b>	<b>7</b>
Analyze/Quantify Risks	<b>1</b>	<b>2</b>	<b>4</b>	<b>4</b>
Integrate Risks	<b>2</b>			
Assess/Prioritize Risks	<b>4</b>	<b>4</b>	<b>5</b>	<b>5</b>
Treat/Exploit Risks	<b>4</b>	<b>4</b>	<b>6</b>	<b>6</b>
Monitor & Review	<b>5</b>			

## LEARNING OBJECTIVES

In addition to the requirements cited in the Learning Objectives specific to each Risk Management Process step below, the ERM expert should have a working knowledge of:

- Economics
- Business finance and accounting
- Statistics and stochastic modeling
- Project management

### I. Establishing Context

This first step in the Risk Management Process involves achieving a full understanding of the present conditions in which the organization operates. This includes understanding the external context (e.g., organization/environment relationship, stakeholder communication policies), the internal context (e.g., business objectives, oversight structure, key performance indicators), and the risk management context (e.g., units covered, degree of coordination throughout organization).

Regarding this step, the expert should be able to:

- Identify the key business issues in the organization's industry, including growth prospects, degree of competition, barriers to entry, supply and demand levels, product differentiation, price elasticity, regulatory environment, etc.
- Analyze the organization's competitive position within its industry.
- Articulate the organization's mission/vision/strategic objectives
- Identify the organization's various specific business objectives and constraints (e.g., financial, social, political, legal) and the interplay among them.
- Identify the organization's business model, management and governance structure, decision-making processes and systems.
- Interpret the organization's financial statements and key performance indicators.
- Evaluate the practical implications of the major stakeholders' (e.g., shareholders, employees, clients) expectations of the organization.
- Determine the organization's key assets.
- Conduct a strengths/weaknesses/opportunities/threats (SWOT) analysis.
- Elicit and describe the organization's risk management objectives.
- Describe the organization's risk control processes.
- Formulate risk management mission statement, policies and guidelines.

### II. Identifying Risks

This second step in the Risk Management Process involves documenting the conditions and events that represent material threats to the organization's achievement of its objectives or represent areas to exploit for competitive advantage.

The scope of risks includes the following Risk Types:

- *Hazard* risks, such as:
  - Liability suits (e.g., operations, products, environmental)

- Fire and other property damage
- Windstorm and other natural perils (including catastrophes)
- Theft and other crime
- Personal injury, disease, disability (including work-related injuries and diseases)
- Business interruption
- *Financial* risks, such as:
  - Price (e.g. asset value, interest rate, foreign exchange, commodity)
  - Liquidity (e.g. cash flow, call risk, opportunity cost)
  - Credit (e.g. default, downgrade).
  - Inflation/purchasing power
  - Hedging/basis risk
- *Operational* risks, such as:
  - Business operations (e.g. customer satisfaction, human resources, product development, capacity, efficiency, product/service failure, trademark/brand erosion)
  - Empowerment (e.g., leadership, change readiness)
  - Information technology (e.g. relevance, availability)
  - Integrity (e.g., management fraud, reputation)
  - Information/business reporting (e.g., budgeting and planning, accounting information, pension fund, investment evaluation, taxation)
- *Strategic* risks, such as:
  - Competition
  - Customer wants
  - Demographic and social/cultural trends
  - Technological innovation
  - Capital availability
  - Regulatory and political trends

Regarding this step, the expert should be able to:

- Generate a comprehensive list of risks that may affect the organization's objectives, using a systematic application of appropriate risk detection techniques, such as:
  - Expert interviewing
  - Site inspections
  - Checklists
  - Document and data reviews
  - Scenario analysis
- Identify the area of impact (i.e., on earnings, cash flow, etc.) of each risk.
- Identify the possible causes and scenarios underlying each risk.
- Qualitatively determine the materiality of each risk in the context of the organization's objectives, and considering the potential correlation with other hazard, financial, strategic and operational risks.
- Select and rank order the risks for further analysis.
- Classify the risks in a manner that is meaningful to their mitigation, for example:
  - Separate the risks that can be simply and immediately mitigated from those that require a substantial capital outlay or a change in strategic direction.
  - Determine those risks requiring rigorous quantification and modeling.

### **III. Analyzing and Quantifying Risks**

This third step in the Risk Management Process involves calibrating and, wherever possible, creating probability distributions of outcomes for each material risk.

Regarding this step, the expert should be able to:

- Identify and access the sources of relevant external data on the quantification of risks relevant to the organization's industry.
- Collect and organize the necessary internal data on the quantification of risks unique to the organization.
- Understand and apply appropriate risk quantification approaches, depending on the nature and availability of data and expert input, including but not limited to:
  - Probability distribution fitting to historical data
  - Extreme Value Theory
  - Regression over variables that affect risk
  - Causal modeling
  - Influence diagrams
  - Fuzzy logic
  - Delphi method
  - Judgement
- Express the risks in terms of a probability distribution of outcomes.
- Assess the effectiveness of existing control measures (managerial, technical, procedural, financial, insurance, etc.).
- Modify the probability distributions as appropriate to reflect the impact of existing control measures.
- Provide estimates of the timing and duration of the outcomes in the context of the organization's objectives and strategies.
- Determine the present value of the future stream of contingent financial outcomes.
- Validate the qualitative rank ordering of risks (from process step II) under various quantitative risk expressions, such as:
  - In the context of the organization's objectives and strategies, using the organization's key performance metrics (e.g., net operating earnings, probability of ruin, growth in embedded value).
  - In the context of impact on the organization's social and other non-financial objectives (e.g., commitment to the community, commitment to employees).
- Determine a suitable model for the particular business situation:
  - Identify, through the application of statistical tests, the frequency and severity probability distributions and parameters that best fit the data.
  - Assess the variability of the parameters and the goodness of fit of the model, to determine the confidence that should be given to the model output in making decisions.
  - Consider the quality and credibility of the data.
  - Conduct sensitivity testing of the models and assumptions.
  - In the absence of an actuarial or other established quantitative model or data for a given situation, make reasonable judgments using sound business logic.

#### IV. Integrating Risks

This fourth step in the Risk Management Process involves aggregating all risk distributions, reflecting correlations and portfolio effects, and expressing results in terms of impact on the organization's key performance indicators (i.e., the "aggregate risk profile").

Regarding this step, the expert should be able to:

- Determine and document the correlations and causes of interaction among the various hazard, financial, operational and strategic risks, using appropriate qualitative and quantitative techniques including but not limited to:
  - Influence diagrams/event tree analysis
  - Decomposition analysis
  - Analysis of variance
  - Multiple regression analysis
  - Econometric methods
  - Neural networks
- Understand different models and types of analysis commonly used to aggregate risks, know their common features and differences, and apply them appropriately.
- Identify and describe the importance of reliances, assumptions and other simplifications (such as the inclusion or exclusion of certain risks) in the model or analysis that could have a material effect on the results.
- Create an aggregate risk profile (i.e., an aggregate probability distribution) of all material risks, reflecting the probability distributions of the individual risks and their correlations, using appropriate techniques, including but not limited to:
  - Monte Carlo simulation
  - Statistical convolution
  - Causal modeling
  - Dynamic Financial Analysis (DFA) and other structural simulation models
  - Mean/variance/covariance (MVC) and other statistical analytic models
- Create an aggregate risk distribution in terms of the organization's key performance metrics.

#### V. Assessing/Prioritizing Risks

This fifth step in the Risk Management Process involves determining the contribution of each risk to the aggregate risk profile, and prioritizing accordingly.

Regarding this step, the expert should be able to:

- Determine the appropriate *risk* measures and organizational tolerances against these measures, such as:
  - Solvency-related measures (related to the "tail" of the distribution)
    - Value at Risk (VaR)
    - Tail VaR
    - Probability of ruin/default

- Expected Policyholder Deficit (EPD)/Economic Cost of Ruin (ECOR)
- Shortfall risk
- Risk Based Capital (RBC)
- Insurance Regulatory Information System (IRIS) tests
- Rating agency models
- Basel Capital Accord measures
- Volatility measures (related to the “center” of the distribution)
  - Variance/semi-variance
  - Standard deviation/downside standard deviation
  - Mean average deviation
  - Below-Target-Risk (BTR)
- Qualitative measures, such as the impact on:
  - The community
  - Employees
  - Brand reputation and image
  - Investor perceptions
- Determine the *reward* measures and benchmarks appropriate to the organization’s objectives, such as:
  - Expected operating earnings
  - Growth in book value
  - Growth in Embedded Value
  - Economic Value Added (EVA)
  - Total return on equity
  - Return on Risk Adjusted Capital (RORAC)
  - Risk Adjusted Return on Capital (RAROC)
- Use appropriate techniques to determine the marginal contribution of each risk to the aggregate risk profile.
- Perform stress testing to determine whether and to what degree the importance of individual risks varies under different risk and reward metrics.
- Prioritize risks according to their marginal impact on the aggregate risk profile.
- Decompose the impact of each high-priority risk in order to inform its treatment.

## **VI. Treating/Exploiting Risks**

This sixth step in the Risk Management Process involves developing strategies for controlling or exploiting the various risks.

Regarding this step, the expert should be able to:

- Identify and evaluate the various financial, operational and strategic techniques to avoid, control, transfer/finance or capitalize on the various types and combinations of risk; such techniques include but are not limited to:
  - Exposure avoidance
  - Loss prevention
  - Loss reduction
  - Segregation of exposure units
  - Contractual transfer

- Insurance/reinsurance
- Risk retention vehicles (e.g., captives, pools)
- Use of financial markets (e.g., lines of credit, derivatives, securitization), including:
  - Arbitrage
  - Futures vs. forward contracts
  - Spot and forward markets
  - Options and swaps
  - Exotic options
  - Foreign exchange
- Evaluate alternate risk financing tools and techniques such as:
  - Special risk insurance solutions
  - Funding alternatives
  - Derivatives
  - Contingent capital
 and their impact on results, such as:
  - Reducing Cost of Risk (COR),
  - Stabilizing COR over time,
  - Strengthening the balance sheet,
  - Optimizing tax position,
  - Leveraging risk-bearing capacity.
- Incorporate the evaluation of key strategies in a consistent, comprehensive model; these strategies include but are not limited to:
  - Capital structure (i.e., financial leverage)
  - Capital allocation
  - Exposure management
  - Asset allocation
  - Reinsurance
- Evaluate strategies by using an optimization framework, which includes:
  - Determining the risk and reward characteristics of each strategy
  - Comparing the strategies in an “efficient frontier” analysis
  - Determining optimal strategies that maximize the organization’s objectives and satisfy its constraints
- Develop a comprehensive risk management strategy and rationale that includes:
  - Evaluating the various options for managing risks.
  - Determining which risks should be controlled and which risks should be exploited for competitive advantage given the nature of the risk and the organization’s capabilities.
  - Constructing an integrated plan of action for control and exploitation of these risks.
  - Demonstrating the business case for the risk management strategy, using sound business logic.
- Develop a comprehensive decision framework by which the organization can evaluate new threats/opportunities in a consistent manner.

## **VII. Monitoring & Reviewing**

This seventh step in the Risk Management Process involves continual gauging of the risk environment and the performance of the risk management strategies.

Regarding this step, the expert should be able to:

- Track changes in the business context and risk environment, by:
  - Keeping current with organizational priorities/objectives.
  - Continually updating the organization's risk profile.
  - Keeping current with regulatory requirements.
  - Keeping current with risk management best practices.
  - Timely detection of future threats and opportunities.
- Measure the performance of the implemented strategies, by:
  - Tracking results against reward measures.
  - Measuring departures from expected results against volatility constraints.
  - Tracking compliance with legal and regulatory requirements.
- Track changing risk factors and use different processes for identifying and sourcing risks such as:
  - "Fish bone" diagrams
  - Run charts
  - Samplings
- Back-test models and assumptions, and make appropriate adjustments.
- Revise strategies as appropriate.
- Determine how often risk models and analyses need to be updated.