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ERM – Early Stage
• Evolution of Toolset
• What is RISK?
• Framing RISK

ERM at CME Group
• Program Design
• Infrastructure
• Product

Seek the Truth
• Is ERM working?
• Effort and Focus
• Strategy Alignment
What is the level of ERM implementation in your organization?

- 31% Adopted ERM recently, but implementation is not fully complete
- 22% Adopted ERM several years ago, and the system is mature
- 20% Adopted ERM recently, and implementation is relatively mature
- 16% In the process of adopting ERM
- 7% Considering the importance of ERM
- 3% No, and not planning for ERM at this time

**Comparison of ERM Adoption % of respondents**

- Adopted ERM: 73% (2011) vs. 53% (2008)
- Planning / In Process of adopting ERM: 24% (2011) vs. 26% (2008)
- No, and not planning for ERM at this time: 3% (2011) vs. 21% (2008)

SOURCE – CORPORATE EXECUTIVE BOARD – RISK MANAGEMENT EFFECTIVENESS SURVEY – FEBRUARY 2011
RISK (early Italian – riscaire - to dare) – A CHOICE - TO DO – DECISIONS! ENTERPRISE RISK MANAGEMENT

How will humans recognize and respond to the probabilities they confront?

Inflection Point

Beginnings
3500 BC to 500 AD
- Greeks
- Gambling
- Philosophy & Probability

Math & Algebra
500 to 1600 AD
- Arabs and Hindus
- Math and Algebra

High Math/Stats.
1600 to 1900 AD
- High Mathematics
- Threshold to RISK

Modern Era
1900 to Present
- High Mathematics
- Threshold to RISK

• Greeks – Well developed Numbering System
• 500 AD – Hindu Numbering System – the ZERO is born
• 825 AD - al-khwārizmi: Rules for Computing: Hisab al-jabr wa’l-muqabalah (Science of Transpose and Cancel)
• Cardano: Galileo, Fibonacci: Da Vinci
• The Bernoullis: Calculus: The ‘Theory of Probability’
• Measurement of a New Theory on the Use of Statistics and Probability in Insurance
• “Von Neuman (1903-1957) invents Game Theory:
• Markowitz (1952) Modern Portfolio Theory
• Fischer, Black, and Scholes (1973) Pricing of Options
• Kahneman and Tversky (1979) Prospect Theory

\[
\int_a^b f(x) \, dx = F(b) - F(a).
\]

\[
\frac{d}{dx} \int_a^x f(t) \, dt = f(x).
\]
**RISK Definitions – Mandates – Guidance – Frameworks – What is the TRUTH?**

**AUDIT RISK**
Audit risk or residual risk or acceptable audit risk (AR) = Inherent Risk (IR) * Control Risk (CR) * Detection Risk (DR)

**COSO (2004)**
COSO defines ERM as a "...process, effected by an entity's board of directors, management, and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives” ...

**FINANCE**
In finance, risk is the probability that an investment's actual return will be different than expected...
Damodaran’s view - risk includes not only "downside risk" but also "upside risk" (returns that exceed expectations)...

**Industries e.g. NUCLEAR - AIRCRAFT – HEALTHCARE**
Tolerable if ALARP - "as low as reasonably practicable“ – high sensitivity

**RIMS (Sarnie)**
ERM is holistic management of all material risk. Simply put, it is the view and identification of risk throughout the organization and the steps that are being taken to manage the risk.

**Information Security**
Potential that a given threat will exploit vulnerabilities of an asset or group of assets and thereby cause harm to the organization...

**ISO 31000**
ISO 31000 (2009) /ISO Guide 73 definition of risk “the effect of uncertainty on objectives” ...

**Hubbard**
You can have uncertainty without risk but not risk without uncertainty

- Uncertainty - lack of complete certainty - existence of more than one possibility – “true” outcome/state/result/value is not known
- Measuring Uncertainty - set of probabilities assigned to a set of possibilities. e.g. there is a 60% chance the market will double in 5 years
- RISK: State of uncertainty where some of the possibilities involve a loss, catastrophe, or other undesirable outcome
- Measuring RISK: A set of possibilities quantified probabilities and quantified losses. e.g. There is a 40% chance the proposed oil well will be dry with a loss of $12 million in exploratory drilling costs
The essence of RISK MANAGEMENT lies in maximizing the areas where we have some control over the outcome while minimizing the areas where we have absolutely no control over the outcome or the linkage between cause and effect is hidden from us.

Peter Bernstein in “Against the Gods: The Remarkable Story of Risk
Framing RISK

“Risk”

“Uncertainty”
Let Us Dissect a **RISK**

Causal Factors

**Uncertainties**

**Levers**
or “Decisions”

**Event**

**No Event**

**Pr(Event)**
or “likelihood”

**What Matters - (NPV)?**

**Value**

(Impact Range)

- Critical
- Major
- Moderate
- Minor
- Negligible

**Impact Range | Event**
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Firm A

CME Group

Firm B

- Interest Rates
- Equity Index
- FX
- Energy
- Commodity
- Metals
- Weather
- Real Estate
CME Group ERM

Futures exchanges facilitate the management of uncertainty very effectively

We use the same characteristics to better manage uncertainty in our own organization

Transparency  
Liquidity  
Efficiency  
Safe, Fair & Reliable
ERM Program Objective

“Get the right information to the right people at the right time so they can make informed decisions.”
ERM Program

Risk Management Team

People  Structure  Process

Aggregate, Discern, Distill

Distribute

Board  Exec Team

Safe, Fair & Reliable

Document and Track

Liquidity  Transparency  Efficiency

New / existing uncertainty

New / existing uncertainty

Accept (Do nothing additional)

Learn More (reserve judgment)

Act (Do something additional)
Promote a **common understanding** and perspective on the top uncertainties facing CME Group.

- What are the most significant uncertainties?
- How has our exposure to these uncertainties changed?
- What activities are planned or already underway?
- How do we anticipate our exposure to these uncertainties changing?
- Given this, are we comfortable with this exposure at current level?