

Risk is Opportunity.™

Applications of ERM: Governance and a Case Study

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Actuaries Club of Hartford & Springfield

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Agenda

- § ERM Goals, Objectives, Governance
- § Modeling processes
- § Case study



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ERM Goals, Objectives, Governance



What is ERM?

“ERM is the process by which organizations in all industries assess, control, exploit, finance, and monitor risks from all sources for the purpose of increasing the organization’s short and long term value to its stakeholders.”

- “Overview of Enterprise Risk Management”, Casualty Actuarial Society, May 2003

Understand risk at
enterprise level

Informed
strategic
decisions

ERM is not a compliance activity



An organization should have a well-established ERM process that is fully integrated into enterprise decision-making in 3 to 5 years

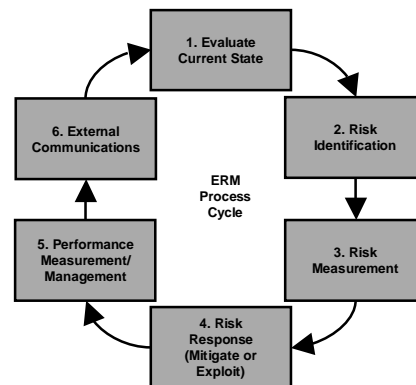
Critical Success Factors

The following key factors will determine the success or failure of an ERM program over the 3- to 5-year horizon

1. Organizations must establish an economic point of view regarding impending regulatory and measurement changes (Solvency II, IFRS)
2. Model integration is a critical, time-consuming process. The selection of the modeling approach is only the first step in the implementation of a successful risk quantification method
3. Organizations must have a solid understanding of risk appetite, and revisit the issue of risk appetite regularly in response to environmental and business changes
4. Companies should maintain a regular process for risk identification, risk assessment, risk response and performance measurement
5. ERM should be fully integrated into the decision-making process of the organization, with risk assessment processes defined for different levels of decision making

ERM Process Cycle

Companies should plan to have a mature ERM process cycle within a 3- to 5-year time horizon



Designing a Successful Enterprise Risk Management Function



§ Leadership must set the "tone at the top" and set a clear mandate for ERM throughout the organization. Risk awareness is for everyone

§ The ERM program must fit the organization's culture – i.e., a decentralized organization needs a different ERM structure than one that is centralized

§ Clear roles and responsibilities must be prescribed for board, board committees, senior management, and other risk personnel

§ Risk roles and accountabilities must be such to assure independence between management and risk measurement

§ ERM must be integrated into decision-making process. Business decisions should be based on appropriate risk-adjusted metrics

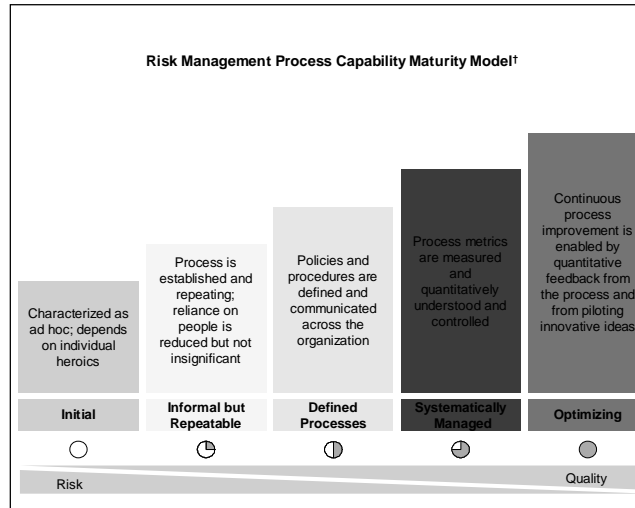
§ Incentive compensation must drive the desired risk behavior

§ The board and leadership should communicate the risk profile and ensure it is integrated with the company's strategy

§ Process for monitoring and reporting risks is needed. The board must be kept informed of major risk developments and have access to senior risk personnel

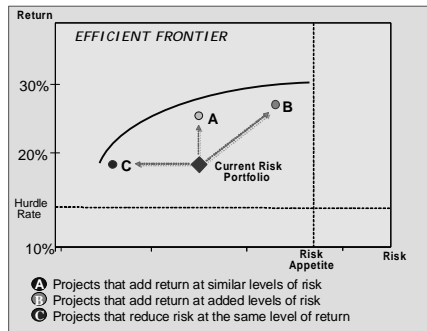
A risk management process capability maturity model helps an organization to assess its current state and set direction for the future state

Improving Risk Management Capabilities
 The Risk Management Capability Maturity Model is a tool to help identify and classify the current state of risk management capabilities.



*Adapted from the Capability Maturity Model framework developed by Carnegie Mellon University, 1993.

Best practice advances an ERM program beyond risk avoidance and uses the ERM framework to make strategic decisions



Efficient Frontier

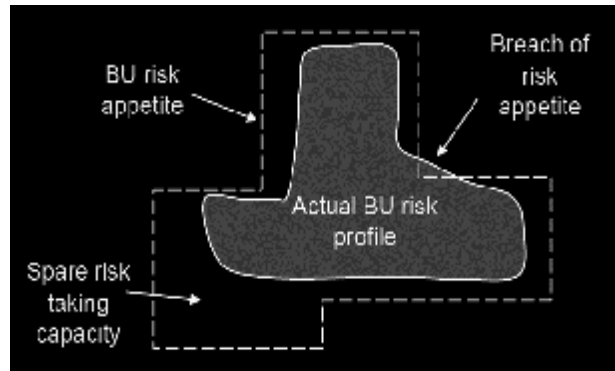
- § Evaluate each project by comparing the project's expected return to the company's hurdle rate and quantifying how much additional risk the project adds to the enterprise.
- § A company needs interactive models to understand how its risk profile reacts to different policies such as changes in market exposure, retention limits, desired profit margins and catastrophe reinsurance.

Risk Opportunity Forum

- § Create a risk opportunity forum to find ways to better capitalize on risk:
- § Senior management develops a list of activities that could result in value creation by exploiting the company's risk profile.
- § Make this process part of the company's periodic strategic planning.

Risk Response

- n Avoid
- n Reduce
- n Transfer
- n Accept
- n Exploit



Risk Governance



Lessons from other industries

- § Drive Diversity
- § Simulate Disaster/Look for Trouble
- § Aggregate Data/Scrutinize Complexity
- § Value Experience
- § Empower the Front Line

-World Economic Forum, April 2010

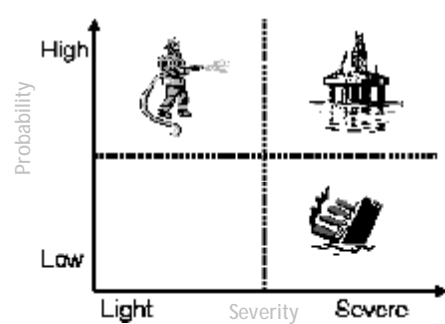


Modeling Processes



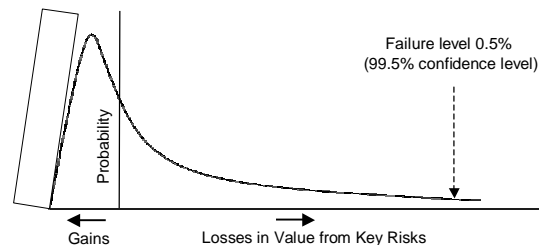
Limits of Quantification

- Must anticipate risks to model
- Current modeling of rare events is crude
- Plan for “what-if” scenarios



ERM Myth: A model can answer all risk management questions

Economic Capital: One Possible Definition Probability Distribution of Modeled Outcomes



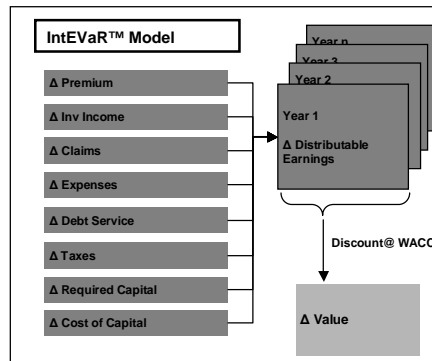
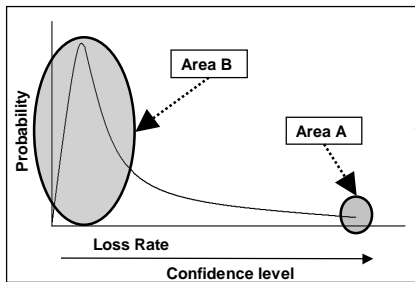
“EC is the level of capital that results in no more than a **0.5%** chance of failure over a **one-year** time horizon, where failure is defined as **market-value based capital dropping below the rating agency target rating requirement**” where:

- MV-based capital is defined as the excess of the MV of assets over the market consistent value of liabilities
- 0.5% failure level translates approximately to AA rating per S&P’s Financial Products Company ratings methodology
- Items in **bold** can be varied to fit a company’s desired definition of EC

Fully Leveraging Economic Capital

Value-Based ERM encompasses and extends Economic Capital models

- ⌋ Exclusive focus on the tail (Area A) ignores more actionable volatility information (Area B).
- ⌋ Shifting the focus to value provides direct link between EC and decision-making.
- ⌋ Changes needed:
 - Project new business
 - Include operational and strategic risks
 - Project required capital



Failure Modes and Effects Analysis (FMEA)

Background

Description:

- Failure modes and effects analysis is a tool used to prioritize potential process or product defects based on their severity, expected frequency and likelihood of detection.

History:

- Was encouraged in the 1960's for space product development and served well on getting a man on the moon. Ford Motor Company reintroduced FMEA in the late 1970's for safety and regulatory consideration after the disastrous "Pinto" affair. Ford Motor Company also used FMEAs effectively for production improvement as well as design improvement.

How to Use (Overview):



When to Use:

- Used to identify probable failure modes and develop optimum design.

Source: <http://www.quality-one.com/services/meahistory.cfm>, Deloitte Analysis

Case Study



IntEVaR™ is a proprietary spreadsheet-based modeling tool that quantifies risk by assessing the impact to a company's enterprise value

The IntEVaR Approach to Risk Quantification

- IntEVaR takes a stress testing approach to evaluating risk by assessing individual risks at selected levels of severity.
- The approach produces a value-based view of ERM which allows the company to manage risk using familiar value-based management concepts.
- Risks can be modeled independently or in combination to assess risk on an enterprise-wide basis.
- A large number of scenarios can be run to create a probabilistic view of enterprise risk.

Key Features of IntEVaR

- In order to preserve the greatest flexibility and simplicity in the model, the IntEVaR model is customized to the company and to the specific risks that management wishes to analyze, so that unnecessary detail is minimized.
- The spreadsheet platform for IntEVaR allows the model to be easily updated as baseline projections change or new risks need to be added.
- The open access design of the model allows it to be readily modified to assess the impact of proposed risk mitigation strategies, thereby providing a platform for cost-benefit analysis.



Case Study Activities and Constraints

We were hired to assist Company "A" achieve its desired end state, which included a defined ERM methodology and augmented modeling capabilities:

Key Activities

Company A wanted assistance with:

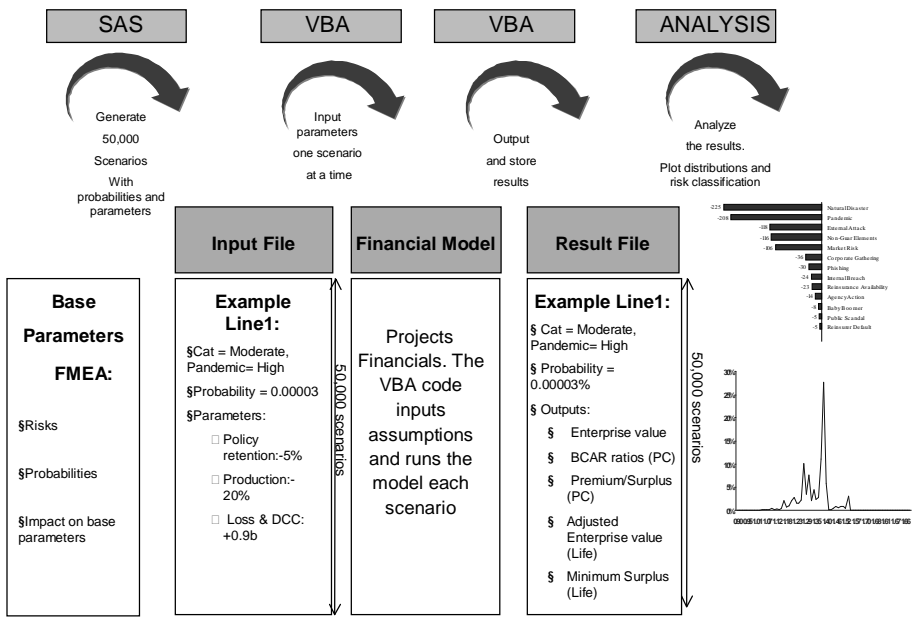
- n Developing an ERM methodology consistent with a value-based ERM approach
- n Developing a risk governance structure appropriate for supporting enterprise-wide ERM objectives
- n Enhancing current modeling capabilities resulting in a high level model capable of quantifying risk and performing scenario testing

Constraints

Company A had the following constraints:

- i Avoid the use of complicated modeling software to create a complex Economic Capital (EC) model, at least in the early portion of program
- i Facilitate an enterprise-wide approach, suitable for all lines of business (including life, P&C, leasing, etc.) and all types of risks

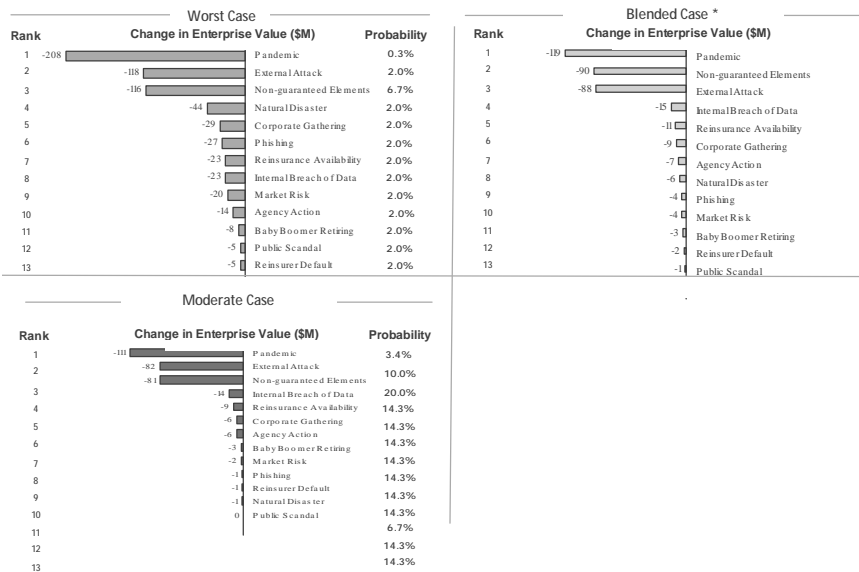
Overall Schematic of the ERM process



The risk scenarios can be inventoried and the modeling impacts identified in a single spreadsheet or table

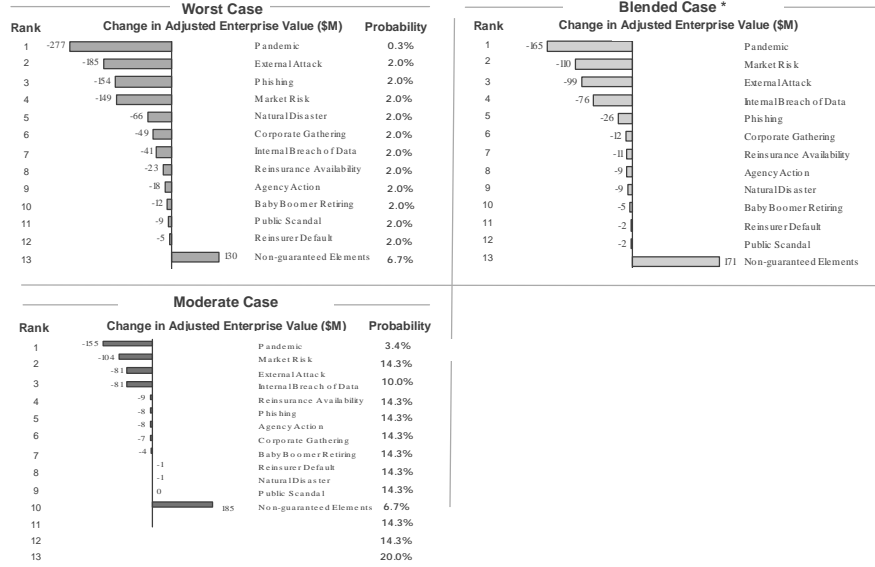
Summary			
Risk Category	Risk Type	Definition / Examples of Risk	Model Impact
Market Risk	Interest Rate Volatility	Interest rate scenarios	Not applicable
Credit Risk	Reinsurer Default	Larger reinsurer with ceded reserves equal to 50% of total ceded reserve	Reinsurance premium and recoverable
Operation Risk	Baby Boomers Retiring	Non-agent populations is 45+ and can retire at age 55	Agent production and retention, corporate fixed expense
Operation Risk	DSNP External Attack	Network worms / Hacker breakthroughs	Surrender rate and fixed expense
Operation Risk	DSNP Privacy Phishing	3 rd party data vendor of A's sells customer list	Surrender rate
Operation Risk	DSNP Internal Breach of Data	Employee with access to information erases key data	Agent production, surrender rate, corporate fixed expense
Operation Risk	Corporate Gathering	Plane crash for top agents	Agent production, retention and hiring rate, claims
Operation Risk	Natural Disaster	F4 Tornadoes	Agent production, surrender rate, mortality rate, corporate fixed expense, claims
Strategic Risk	Pandemic	Avian flu	Agent production, surrender rate, mortality rate, corporate fixed expense
Strategic Risk	Non-guaranteed elements	Rating agency downgrade and policy holder dividend decision by the Board	Agent production, dividend scale, WACC
Strategic Risk	Agency Action	Agents are required to get more involved in investment products resulting in an exodus of agents	Agent retention
Strategic Risk	Public Scandal	Elected official take up an attack on perceived market conduct issue	Agent production and hiring, corporate fixed expense
Strategic Risk	Reinsurance availability	Events in Europe impact capital of parents of US reinsurers causing them to restrict capital	Reinsurance premium and recoverable, agent production, WACC

**Report: Individual Risk Profile
Scenario: Current State
Metric: Enterprise Value**



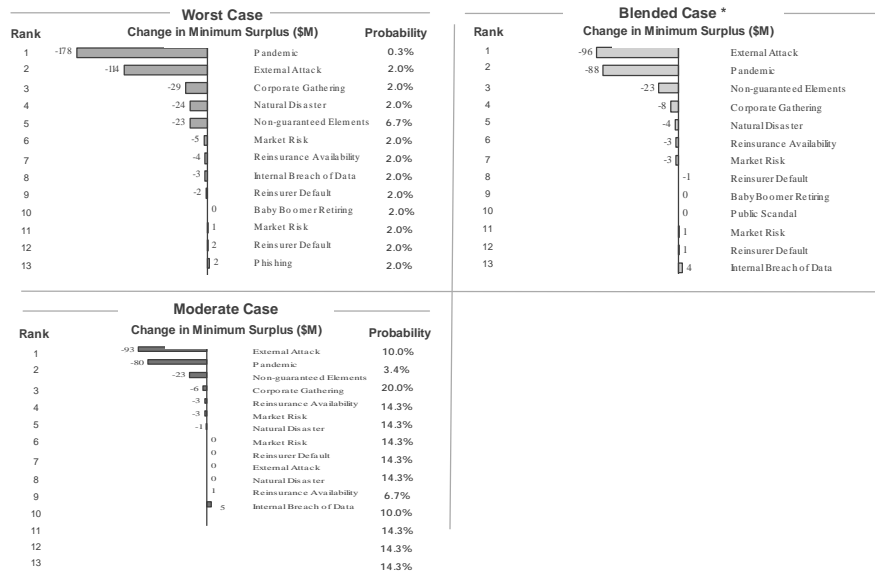
Note: * Blended Case is the expected impact, given that a downside risk occurs: (worst case) x (probability) + (moderate case) x (probability) / (sum of probabilities)

Report: Individual Risk Profile
Scenario: Current State
Metric: Adjusted Enterprise Value



Note: * Blended Case is the expected impact, given that a downside risk occurs: (worst case) x (probability) + (moderate case) x (probability) / (sum of probabilities)

Report: Individual Risk Profile
Scenario: Current State
Metric: Minimum Surplus



Note: * Blended Case is the expected impact, given that a downside risk occurs: (worst case) x (probability) + (moderate case) x (probability) / (sum of probabilities)

Pandemic – Worst Case

Summary of Scenario

Definition

- 10 people fly into LAX with avian flu and 60 days later the entire nation is stage-5 affected; progression over two years is based on 1918 outbreak
- Likelihood: 1-in-333-year event

Impacts / Management Actions

- Death rate increases 10 lives per thousand in force amount
- Illness rate increases
- Employees mostly unable to come into the office to work
- Major disruptions in markets

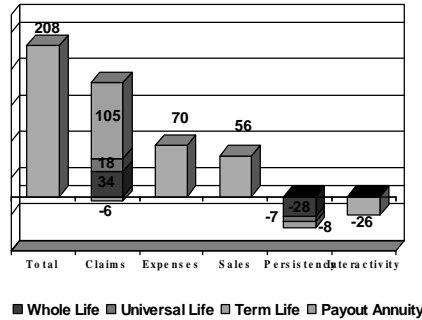
Major Financial Impacts

- Life and Health claims increase
- Increase in costs due to overtime and higher costs of goods/services
- Persistency improves for Life products for several years
- Sales of underwritten products cease for two years and sales of annuities decrease to 35% 1st year and 10% 2nd year

Enterprise Value Durational Impacts

- Year 1: -38.4 million
- Year 2: -128.2 million
- Year 3+: -41.6 million

Decrease in Enterprise Value
Component Attribution



Interactivity is the difference between the individual component impacts and the net integrated impact of all components occurring simultaneously.

External Attack – Worst Case

Summary of Scenario

Definition

- External agent penetrates one PC and then spreads through entire enterprise network (not just A-sub); this can occur from any one of three ways:
 - Network "worm" through the A web page before the firewall
 - Network "worm" through non-blackberry wireless handheld with access to e-mail
 - Hacker through wireless field laptop directly connected to enterprise network
- Breach achieves multiple intended purposes:
 - Likelihood: 1-in-50-year event

Impacts/Management Actions

- All home office PCs/servers down and back up in 1/8 weeks
- Customer call center PCs and phones down
- Agent laptops down and back up within 2-3 hours
- Data destroyed and systems reformatted
- Customer list stolen and sold to replacement artists
- Identity-related data used for identify theft
- Credit card data used for theft
- Media exposure

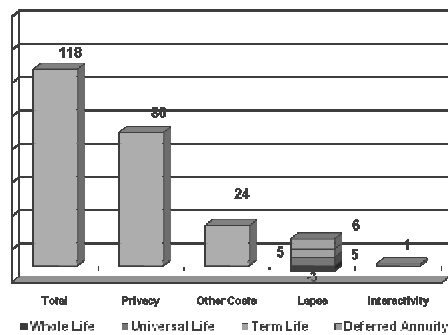
Major Financial Impacts

- Customer notification and monitoring costs (\$100 per) for privacy breach
- Other costs (litigation, fines, etc.)
- Shock lapse of 5% of customers

Enterprise Value Durational Impacts

- Year 1: -92.8 million
- Year 2: -4.9 million
- Year 3+: -20.5 million

Decrease in Enterprise Value
Component Attribution



Interactivity is the difference between the individual component impacts and the net integrated impact of all components occurring simultaneously.

Natural Disaster – Worst Case

Summary of Scenario

Definition

- West-to-East F4 tornado ½-mile wide hits home office during working hours, when concentration of employees at worksite is highest
- Likelihood: 1-in-50-year event

Impacts/Management Actions

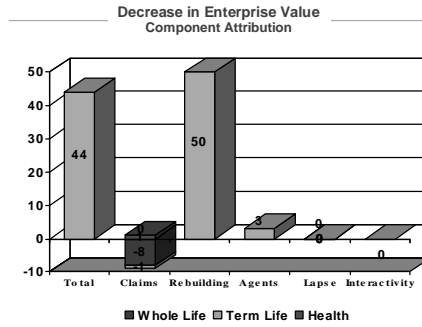
- Total destruction of four A buildings and virtually all contents
- For 90 days, relocate 250 critical employees to Minneapolis site
- After 90 days and up until 2 years, relocate all employees to multiple locations within commuting distance from their homes; these locations would be leased until home offices are re-built
- Re-build home offices in 2 years and relocate employees

Major Financial Impacts

- Death claims (employees and non-employees) on life products
- Rebuilding costs in excess of insurance coverage
- Decreased agent production and retention due to hobbled infrastructure
- Shock lapse to enforce due to drop in service / speed of claims payment

Enterprise Value Durational Impacts

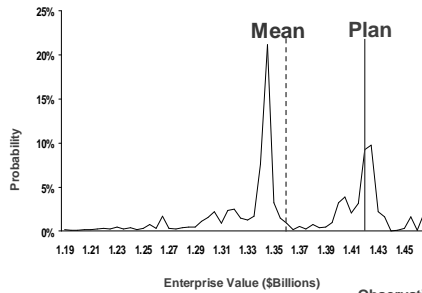
- Year 1: +3.4 million
- Year 2: -55.3 million
- Year 3+: +7.8 million



Interactivity is the difference between the individual component impacts and the net integrated impact of all components occurring simultaneously.

Report: Enterprise Risk Exposure Scenario: Current State Metric: Multiple

Enterprise Risk Exposure (Enterprise Value Metric)	
Plan	\$1.42 B
Mean	\$1.36 B

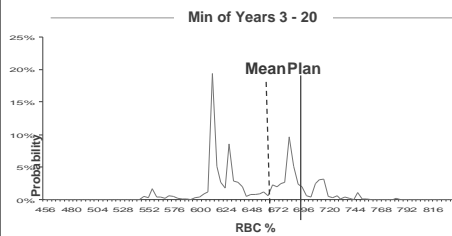
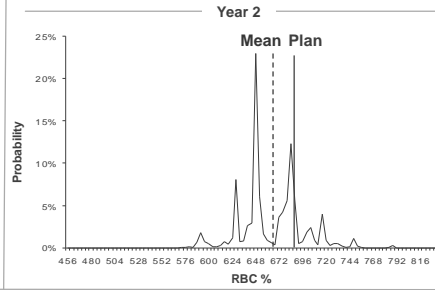
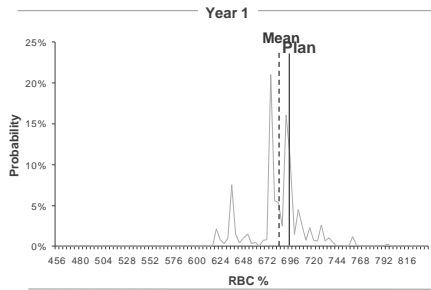


Enterprise Value	< 1.21B	< 1.28B	< 1.35B	< 1.42B
Probability:	1%	7%	56%	91%
Adjusted Enterprise Value*	< 2.68B	< 2.83B	< 2.95B	< 2.76B
Probability:	0%	12%	34%	52%
Year 1 RBC	< 625% CAL	< 659% CAL	< 687% CAL	< 694% CAL
Probability:	3%	17%	51%	69%
Year 2 RBC	< 582% CAL	< 616% CAL	< 650% CAL	< 685% CAL
Probability:	0%	5%	45%	77%
Year 3+ RBC	< 583% CAL	< 617% CAL	< 652% CAL	< 686% CAL
Probability:	5%	32%	55%	77%

- Mean is \$60M below Plan
- Enterprise Risk Exposure is based on top-10 risks (as ranked by Worst Case scenarios)

Notes: * Adjusted Enterprise Value = Enterprise Value + Policyholder Dividends

**Report: Enterprise Risk Exposure
Scenario: Current State
Metric: Risk-Based Capital**



Enterprise Risk Exposure (Risk Based Capital Metric)			
Year 1 Plan	694%	Year 1 Mean	684%
Year 2 Plan	685%	Year 2 Mean	664%
Year 3+ Plan	686%	Year 3+ Mean	650%

Key Advantages of IntEVaR™ for Company A



The use of Excel-based IntEVaR™ was the right choice for Company A for several reasons:

- § The scalability of the tool allowed it to accommodate multiple risks and be extended across Life and P&C operations
- § The tool's flexibility enabled future customization by the client
- § The tool could be delivered to client at end of project
 - Not a software product that would need to be retained by Deloitte or require purchase of a separate system by the client
- § The transparency of Excel allowed client to be fully involved in assumption setting and formula review
- § To develop the base case, we leveraged existing business projections produced by client software, thereby ensuring internal consistency and management buy-in

IntEVaR™ addressed all of Company A's constraints while giving them the right level of sophistication to answer complex questions around risk



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Company “A” Action Steps from ERM Analysis

- § Increased risk awareness and strengthened sense of ERM culture.
- § Re-assessed how much to spend on computer redundancy.
- § Strengthened mitigation strategy for business interruption in case of pandemic or natural disaster.
- § Re-assessed amount of excess capital.
- § Better understood potential losses from non-insurance specific risk factors – e.g., sales force disruptions, weather catastrophes, etc.
- § Realized some risk avoidance measures were redundant when aggregated throughout organization.

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Q&A



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Thank You !



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