APPLYING DATA ANALYTICS TO RISK MANAGEMENT

KUWAIT 5TH ERM CONFERENCE

JANUARY 22ND, 2019

AGENDA

1. INTRODUCTION
2. PERSPECTIVES ON ANALYTICS
3. DATA ANALYTICS AND RISK MANAGEMENT
4. BEST PRACTICES FOR INSURANCE PROGRAM EVALUATION
5. PRACTICAL APPLICATIONS
6. CLOSING COMMENTS

1 INTRODUCTION

THE ANALYTICS VALUE PROPOSITION

WHEN USED PROPERLY ANALYTICS CAN SUPPORT…

2 PERSPECTIVES ON ANALYTICS

WHEN WE SAY ANALYTICS…

WHAT COMES TO MIND?

Supercomputers with blinking lights?

Complicated formulas?

The Black-Scholes Option Pricing Formula

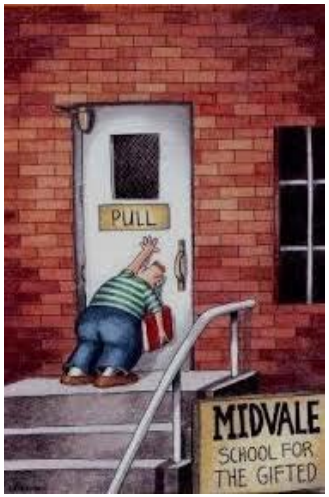
$$c = SN(d_1) - Xe^{-rT}N(d_2)$$

$$p = Xe^{-rT}N(-d_2) - SN(-d_1),$$

$$d_1 = \frac{\ln(S/X) + (r+\sigma^2/2)T}{\sigma\sqrt{T}}$$

$$d_2 = \frac{\ln(S/X) + (r-\sigma^2/2)T}{\sigma\sqrt{T}} = d_1 - \sigma\sqrt{T}$$

S = Stock price.
X = Strike price of option.
r = Risk-free interest rate.
T = Time to expiration in years.
σ = Volatility of the relative price change of the underlying stock price.
$N(x)$ = The cumulative normal distribution function.



Smart people with limited "real world" perspective?

WHEN WE SAY ANALYTICS…

HERE'S WHAT PRACTITIONERS THINK

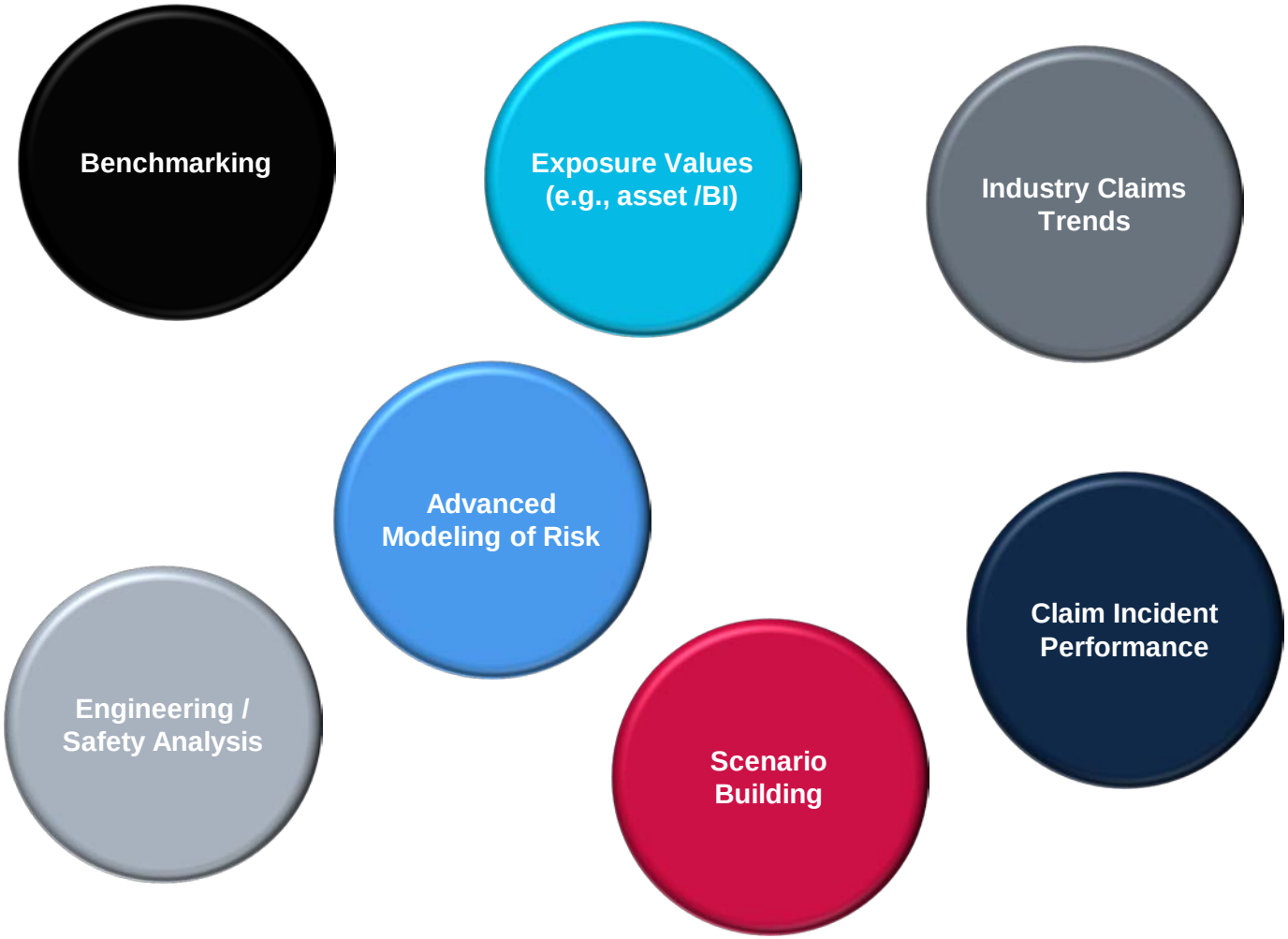
Diagnosing with useful information

Measuring the value of different strategies

Recommending a course of action

NO MATTER A PERSON'S PERSPECTIVE…

ANALYTICS DRIVES RISK AWARENESS AND STRATEGY



3 DATA ANALYTICS AND RISK MANAGEMENT

WHEN APPLYING DATA ANALYTICS TO RISK

KEEP IN MIND THAT…

“All models are wrong, but some are useful.”

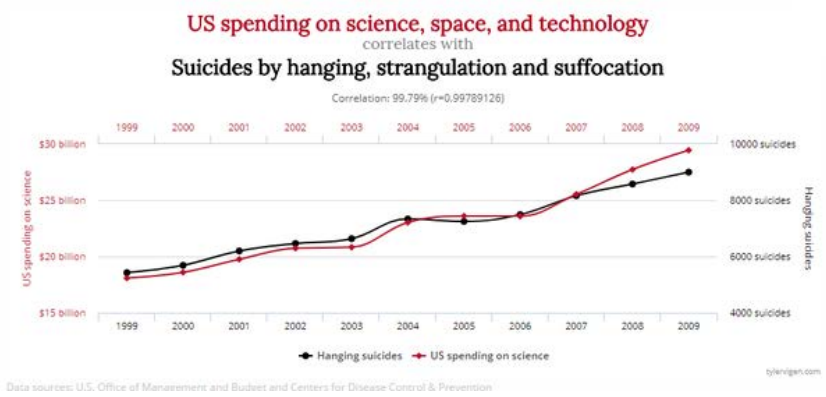
George E.P. Box

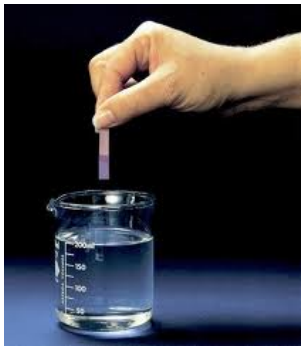
USING ANALYTICS EFFECTIVELY

IF ALL MODELS ARE WRONG

So if models are wrong, how can we build and use them effectively?

- Understand limitations, boundaries, and sensitivities
- Know the assumptions
- Perform litmus tests
- Remember - correlation does not imply causation

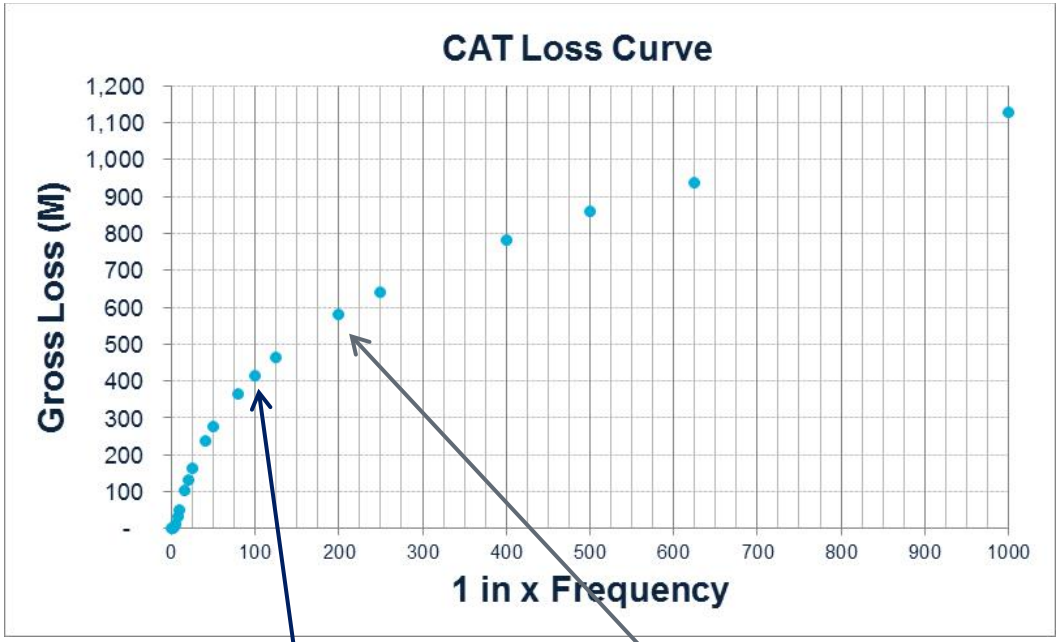




MEASURING VOLATILE OUTCOMES
WHEN SENSITIVITIES AND ASSUMPTIONS MATTER

CAT Modeling Example

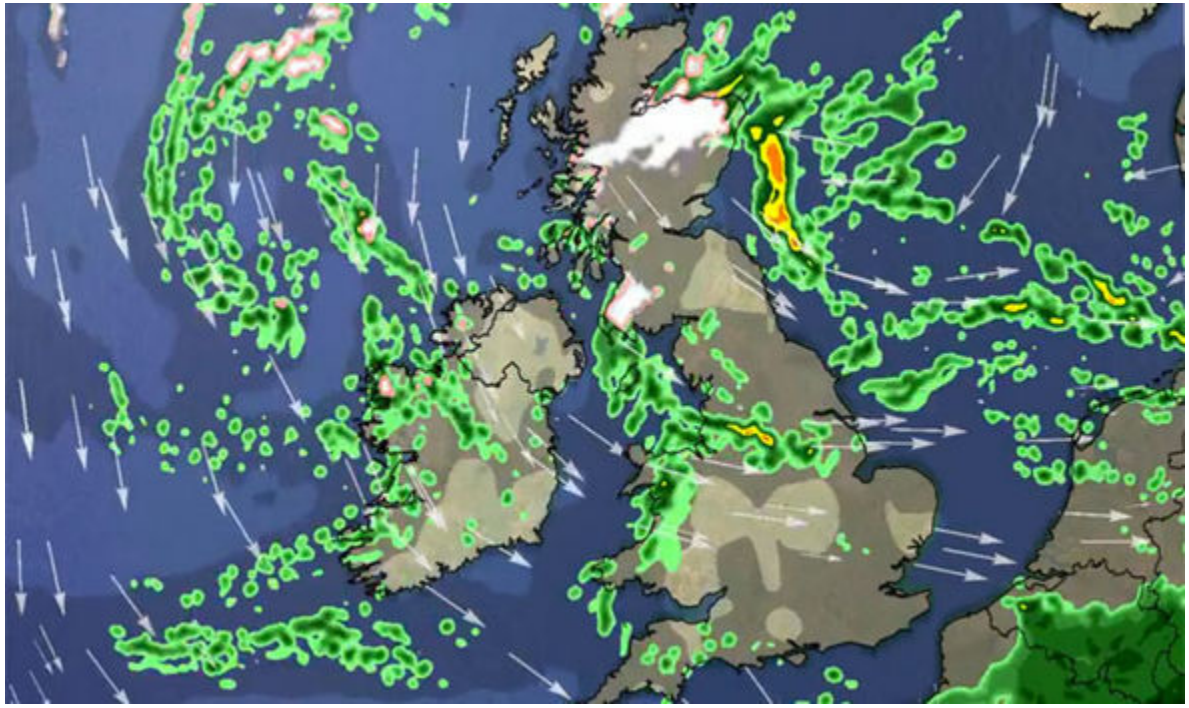
- Understanding sensitivities and assumptions is particularly important when applying analytics to extreme or volatile outcomes.
- When very small increases in confidence level of probability result in big increases in impact – take a second look at the totality of results, assumptions, and sensitivities



ROLE OF DATA

HISTORY CAN HELP IN ESTIMATION OF FUTURE SCENARIOS

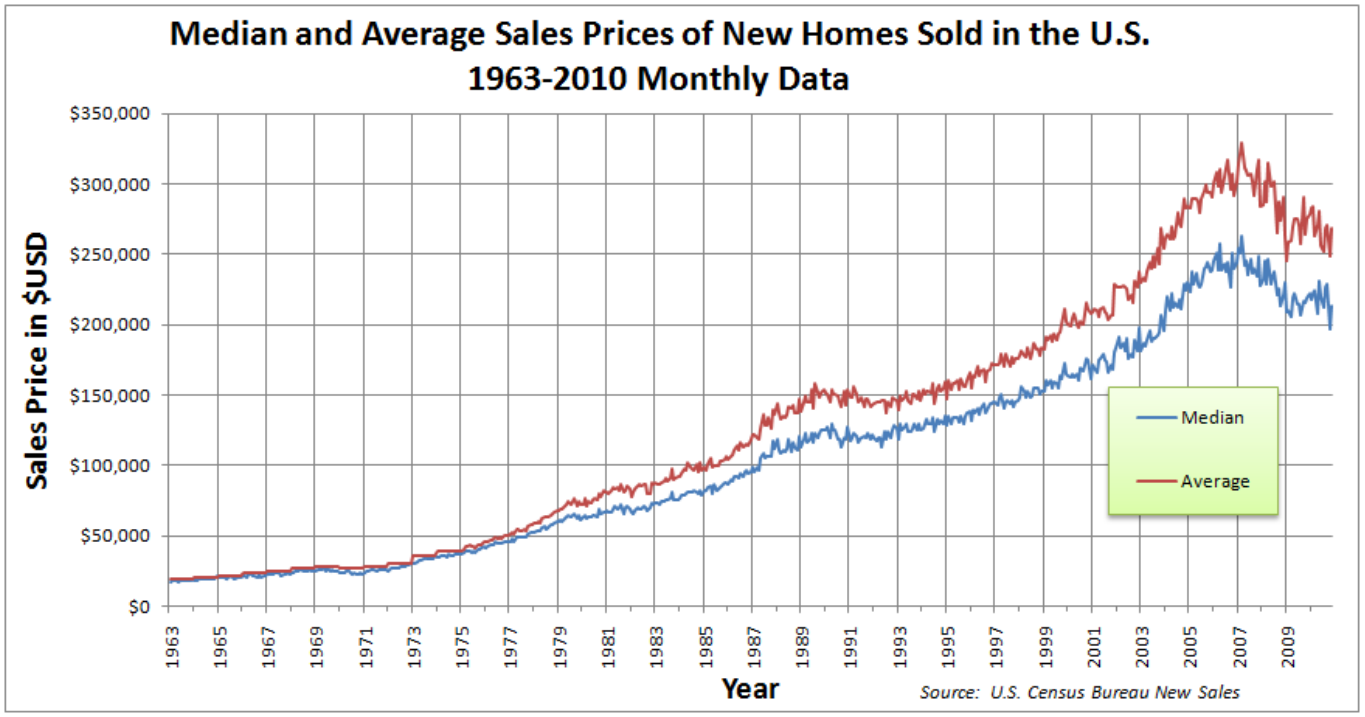
When data is rich, it can be used effectively to assess and make decisions…



ROLE OF DATA

DATA MUST BE SUPPLEMENTED BY UNDERSTANDING

…but history should not be used alone – models should be adjusted to contemplate alternative future scenarios.



Models should not only reflect what has happened, but also what could happen

4 BEST PRACTICES FOR INSURANCE PROGRAM EVALUATION

QUESTIONS RELATED TO INSURANCE
THAT MOST COMPANIES NEED HELP ANSWERING

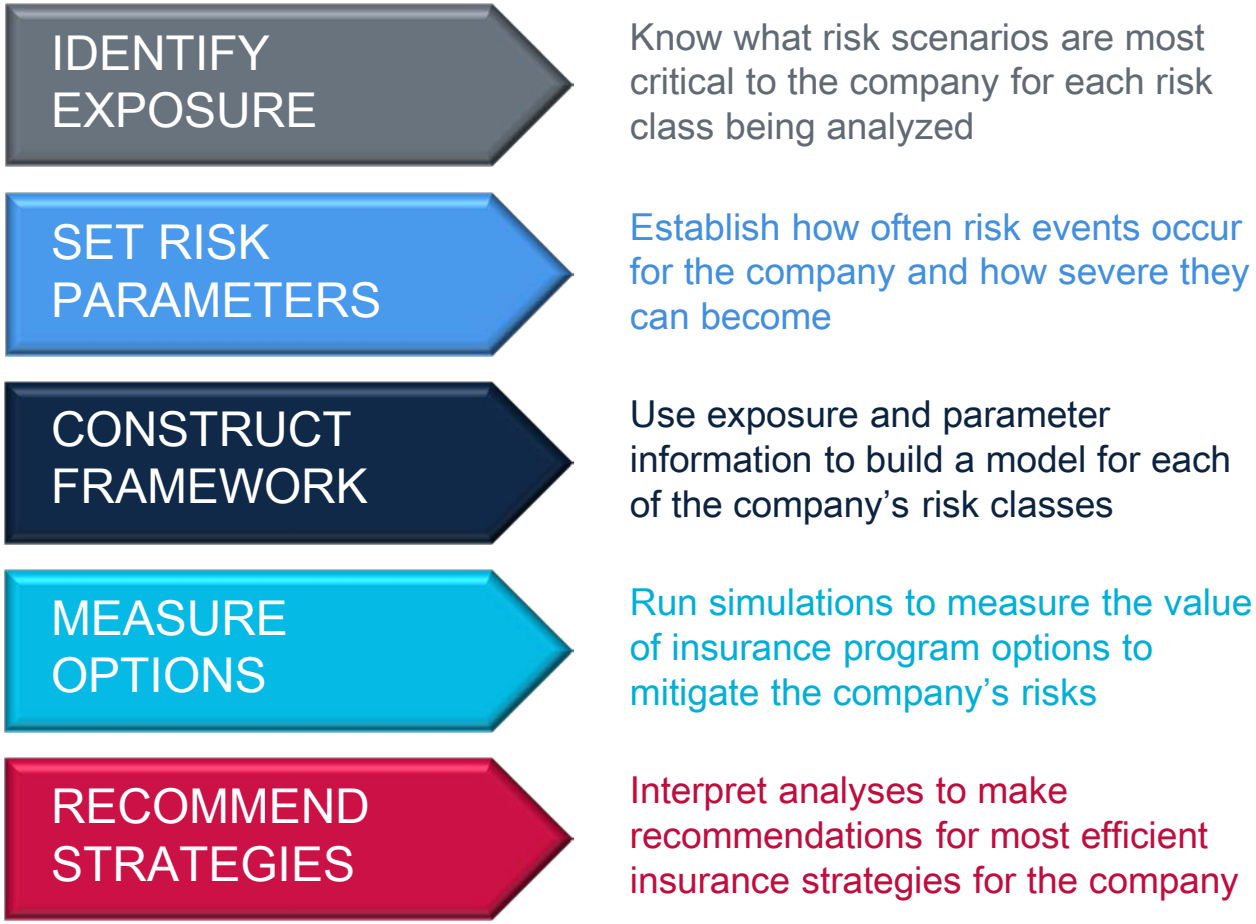
“What are the company’s true exposures to risk?”

“What limit of coverage is best suited to the risk burden of the company?”

“How much risk should the company retain?”

INSURANCE PROGRAM ANALYSIS

BEST PRACTICES PROCESS



IDENTIFY EXPOSURE
CYBER RISK MODEL EXAMPLE

HOW
can losses occur

WHAT TYPES
of losses can occur

Nation State

Hacktivist

Criminal Organization

Malicious Insider

Data Breach

Network Interruption

Extortion

Data Asset Loss

SET RISK PARAMETERS
CYBER RISK MODEL EXAMPLE

WHAT
impacts the HOW
and WHAT TYPES

HOW
are these impacts felt

Type of Company

Number of Records

Annual Revenue

Security Level

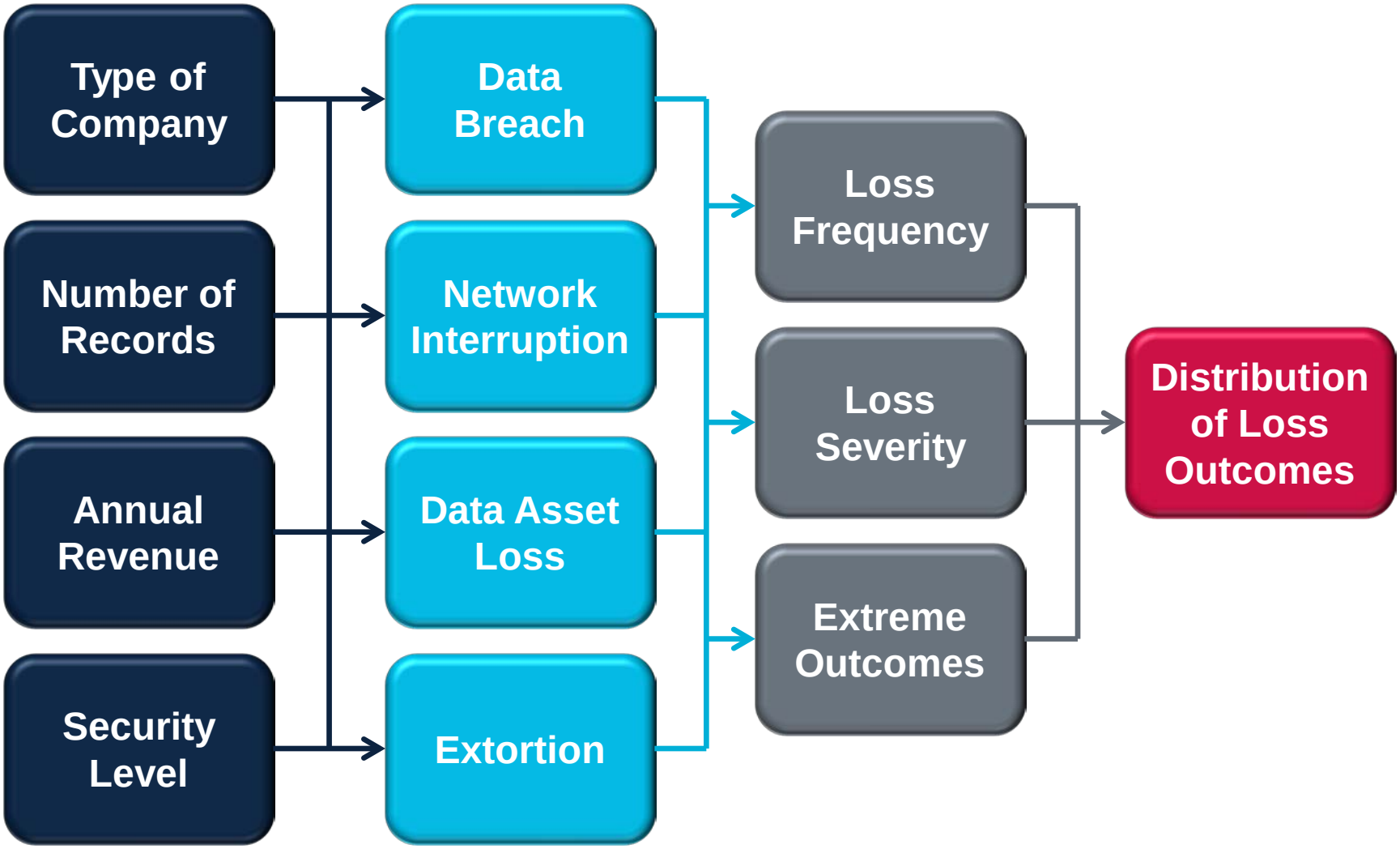
Probability of Loss

Magnitude of Loss

Chance of Extreme Loss Outcomes

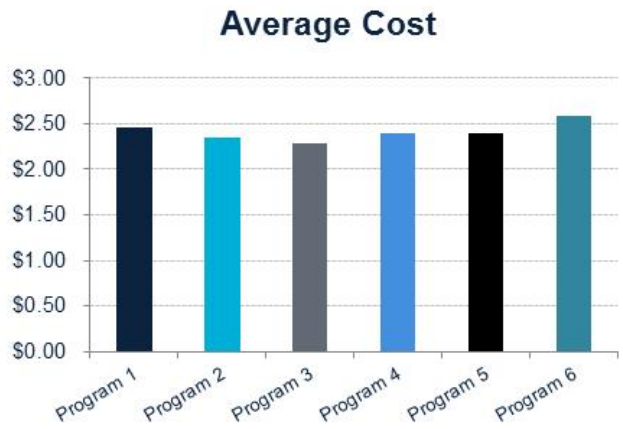
CONSTRUCT FRAMEWORK

CYBER RISK MODEL EXAMPLE



MEASURE OPTIONS
CYBER RISK MODEL EXAMPLE

Cost and Volatility Analysis ($ in M)

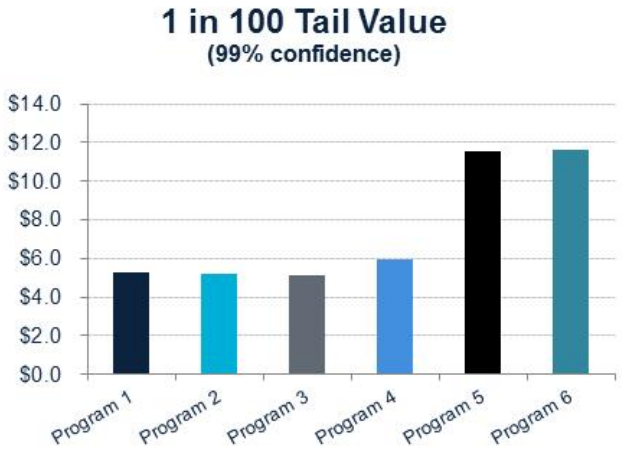


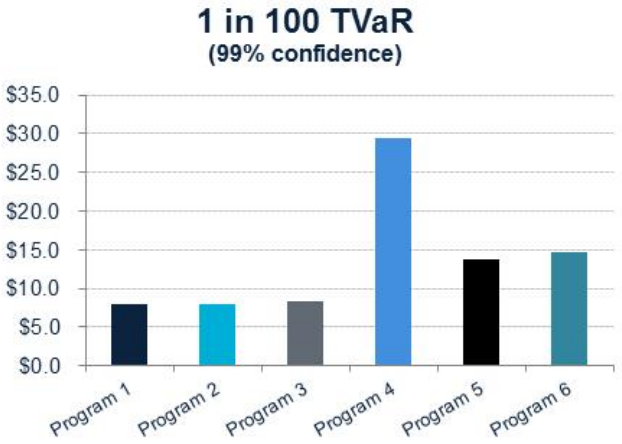
Average Cost = Premium paid for coverage plus average losses net of coverage

Tail Value = loss value at a specific confidence level; e.g.1/100 Tail Value is the loss value at the 99th percentile

TVaR = the average value in the tail defined by confidence level; e.g. 1/100 TVaR is the average of the worst 1% of values

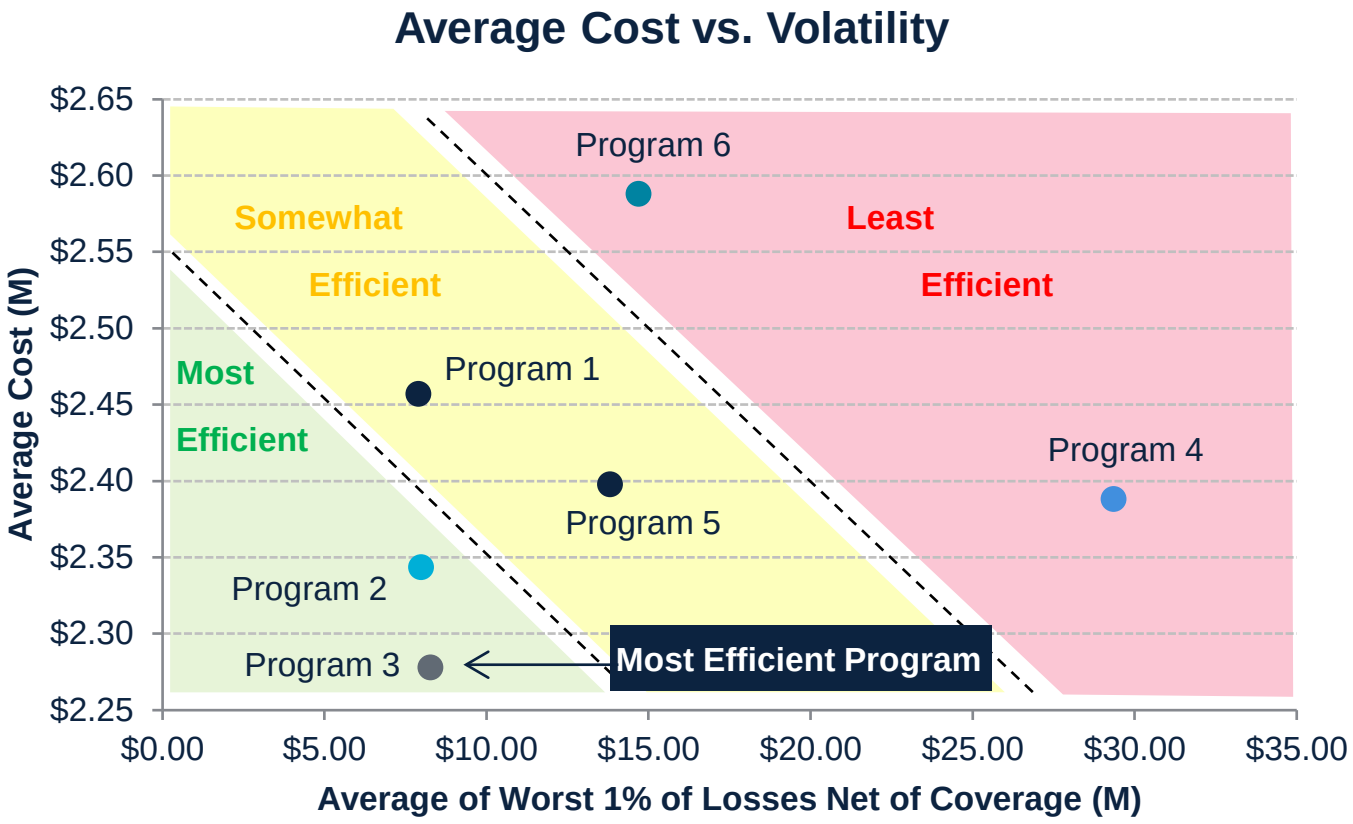
Confidence = confidence level that loss is at the stated value or below





RECOMMEND STRATEGIES

CYBER RISK MODEL EXAMPLE



WHAT IF THERE IS NO DATA?
OR LITTLE DATA, OR CHANGING CONDITIONS

The most challenging risks do not have data and are still evolving.

5 PRACTICAL APPLICATIONS

WHY SHOULD WE DO IT?

BUILDING A RISK MODELING FRAMEWORK

1. **Justification of insurance program purchasing to board**
2. **Large acquisition or divestiture**
3. **Risk profile changing / increasing exposure to emerging risk**
4. **Insurance market conditions change**
5. **Senior management change**

ANALYTICS IN ACTION
FORTUNE 100 MERGER SITUATION

Situation

- **Merger was set to occur, creating a market leader with an extremely limited peer group**
- **Risk management department – believed 1+1 ≠ 2**
- **Not clear what limits and retentions should be across the portfolio**

Approach Taken

- **Sixteen risk classes considered – along with the risk tolerance for each risk**
- **Intensive discussions with the risk management teams of both pre-merger firms**
- **Recommendations needed to be simple to understand – so they could be presented to the Board**

Outcome

- **Recommendations to establish NewCo insurance programs provided – and 95% of recommendations accepted by the Board**

6 CLOSING COMMENTS

THE ANALYTICS VALUE PROPOSITION

WHEN USED PROPERLY ANALYTICS CAN SUPPORT…

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