J. W. Mayo CONSULTING

jwmc-llc.com

J. W. Mayo
CONSULTING

Risk Management and Disruptive Technologies

Joseph W. Mayo

CMMI Associate, PMP, PMI-RMP, CRISC, RIMS-CRMP

joseph.mayo@jwmc-llc.com

Learning Objectives

- At the end of this session, you will:
  - Be able to formulate risk management tactics and strategies that create value for the Enterprise
  - Design a risk management strategy to manage risk associated with disruptive technologies
  - Leverage collective learning to improve their ability to manage new and emerging threats

Agenda

J. W. Mayo CONSULTING

Knowledge doubling curve

Disruptive technologies

- Robots, Artificial Intelligence (AI), Deep Learning

The need for change, making the case

- Malware, ransomware, hardware vulnerabilities, criminal enterprise, economic impact

Bimodal risk management

- Next generation risk management

Strategy and tactics for the future

- Collective learning, quantitative risk management,

Conclusion and Q&A

joseph.mayo@jwmc-llc.com

conferences i/o

We're going to be using a product called Conferences i/o that will allow you to engage with us during this session. **All responses are anonymous!**

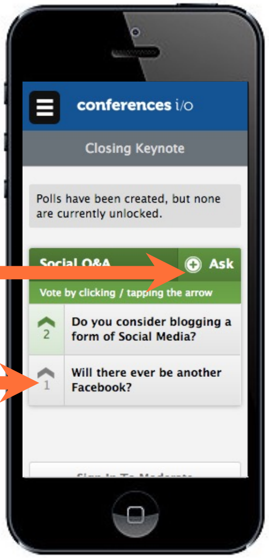
If you have a mobile device (smartphone, tablet, laptop, etc.) please take a moment now, and go to https://taoofrisk.cnf.io

The Conferences i/o app allows you to ask questions, up-vote questions other attendees asked and respond to polls when they appear on your device, all in real time!

joseph.mayo@jwmc-llc.com

J. W. Mayo
CONSULTING

WEBSITE ADDRESS: **TaoOfRisk.cnf.io**



conferences i/o

Closing Keynote

Polls have been created, but none are currently unlocked.

Social Q&A ⊕ Ask

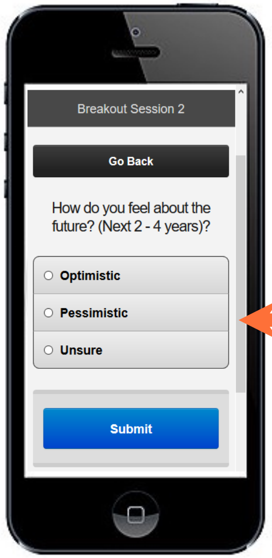
Vote by clicking / tapping the arrow

2 Do you consider blogging a form of Social Media?

1 Will there ever be another Facebook?

Ask a Question

Up-Vote a Question



Breakout Session 2

Go Back

How do you feel about the future? (Next 2 - 4 years)?

○ Optimistic
○ Pessimistic
○ Unsure

Submit

Respond to Polls when they appear

Note: Responses and submissions are anonymous

joseph.mayo@jwmc-llc.com

J. W. Mayo
CONSULTING

Live Content Slide

When playing as a slideshow, this slide will display live content

Poll: What is your role in your current organization?

joseph.mayo@jwmc-llc.com

Knowledge Doubling Curve

J. W. Mayo
CONSULTING

What is knowledge?

- Information and skills acquired through experience or education

Who is Buckminster Fuller?

- American futurist, prominent author, university professor, and inventor of the geodesic dome

What is the knowledge doubling curve?

- Measures the rate of change associated with the common knowledge of humankind

How does the knowledge doubling curve affect risk management?

- Risk practitioners must imagine the unprecedented
- Risk practitioners must develop risk scenarios based on the art of the possible, not just known risk events; focus on the tail

joseph.mayo@jwmc-llc.com

Disruptive Technologies

Robots, both technology robots (aka Bots) and industrial robots

Artificial intelligence (AI)

Deep learning

Internet of Things (IoT)

Robots building robots, audited by robots, and communicating with other robots

Disruptive Technologies

Technology robots

Bots made up 41% of all Internet traffic in 2020

- Good Bots (search engines, monitors, crawlers, feeds, auditors) – 15%
- Bad Bots (impersonators, scrapers, spammers, hackers) – 26%

A 2016 McKinsey Group report suggests Bots can take over entire business processes

- McKinsey Group estimates 286,000 attorney and 70,000 paralegal position are at risk of elimination by technology robots
- 50% of the work in the finance and insurance sectors
- 90% of mortgage application processes

Disruptive Technologies

- **Artificial intelligence (AI)**
  - A Stanford University exercise revealed that artificial intelligence systems from Alibaba and Microsoft performed better than humans in a reading comprehension test.
- **Google's DeepMind AI mastered 1,500 years of chess knowledge in 4 hours**
  - DeepMind learned chess from scratch after only being programmed with the rules
  - DeepMind also developed new chess strategies never before seen by grandmasters
  - Recommendation: AlphaGo documentary (https://www.alphagomovie.com)
- **Deep learning**
  - Autonomous transportation will eliminate 1.7 million truck driver jobs in the next decade
- **Internet of things (IoT)**
  - 31 million smart homes in North America in 2016
  - Experts predict smart homes in North America & Europe exceed 150 million by 2021

The Need for Change, Making the Case

J. W. Mayo
CONSULTING

- **Chip manufacturers produce an estimated 40 billion microprocessors each year**
- **The Meltdown and Spectre CPU flaws were able to be patched**
- **Consider the following scenario**
  - Industrial robots manufacture tens of billions microprocessors based on a flawed design produce by AI
  - The design flaws can't be patched and must be recalled
  - What is the impact of recalling 20 billion or 30 billion consumer products and industrial machines?
  - How do we manage this risk?
- **Disruptive technologies increases the potential of this scenario**

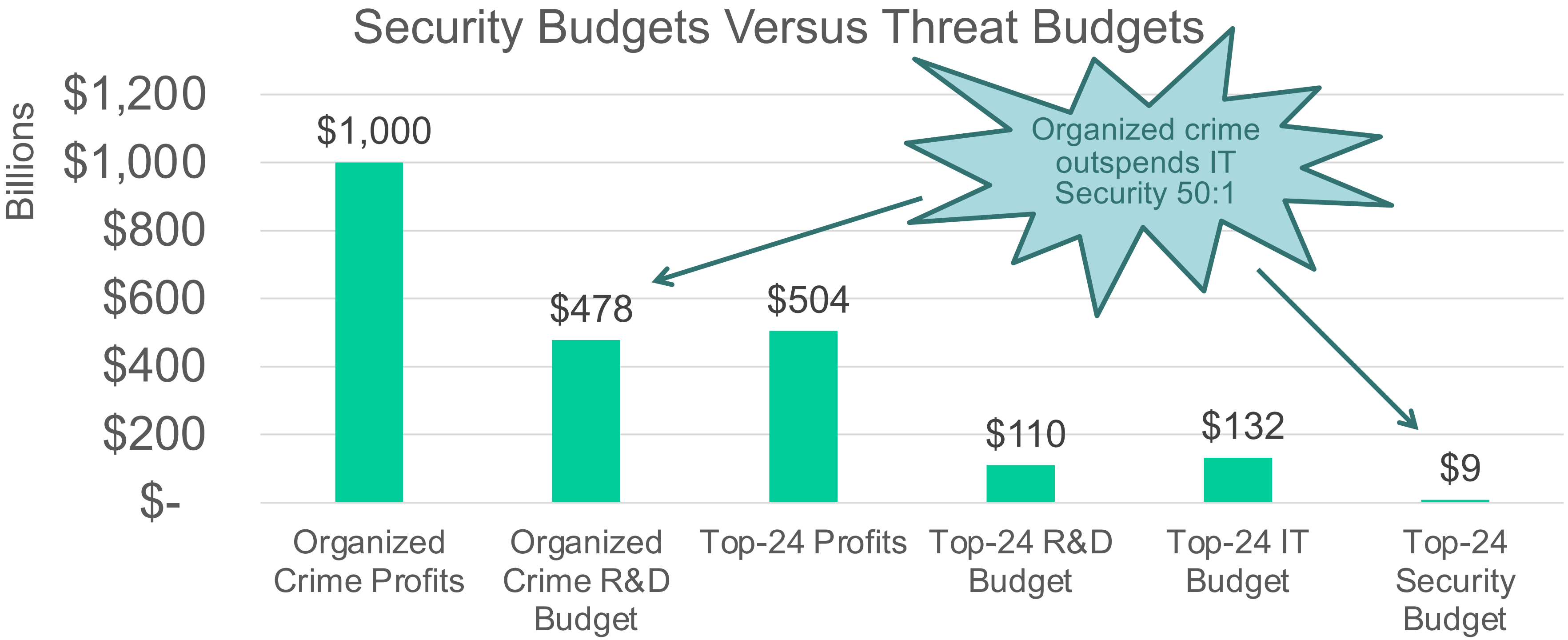
joseph.mayo@jwmc-llc.com

The Need for Change, Making the Case

J. W. Mayo CONSULTING

- **2015 Data Breach Investigations report found that 5 malware events occur every second**
- **In 2016 companies lost an estimated $1.5 billion to ransomware**
- **In 2017 WannaCry ransomware infected more than 200,000 computers, losses expected to exceed $4 billion**
- **Nearly 40% of insider misuse cases were by end users, not necessarily privileged users**

The Need for Change, Making the Case



joseph.mayo@jwmc-llc.com

The Need for Change, Making the Case

J. W. Mayo CONSULTING

- **Risk theory began in the mid-1500s**
- **Actuarial science emerged in the early 1700s** **150 years**
- **Modern risk management emerged in the mid-1950s** **250 years**
- **Can we wait another 50 years for the next evolution of risk management?**
- **What is the next evolution of risk management?**

joseph.mayo@jwmc-llc.com

Bimodal Risk Management

- **Bimodal describes the management of two related but separate practices**

Mode 1

- Produces consistent, reliable results
- Associated with predictable, stable, low-risk operations

Mode 2

- Exploratory and seeks to push the innovation envelope

What is bimodal risk management?

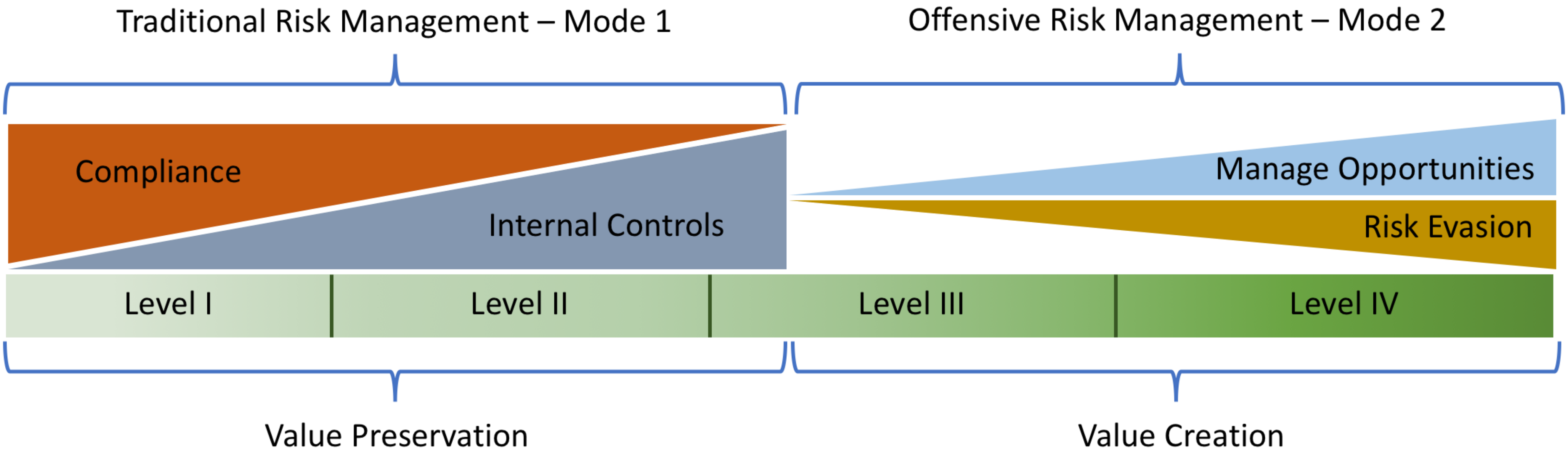
- A holistic, strategic risk management approach
- Extends and expands proven risk management tactics to account for disruptive technologies

Why do we need bimodal risk management?

- Traditional risk management practices are slow to evolve
- We must manage risk events that are predicable AND those that are highly unpredictable

Bimodal Risk Management (BRM)

J. W. Mayo CONSULTING



joseph.mayo@jwmc-llc.com

Bimodal Risk Management

Mode 1 satisfies compliance requirements and preserves existing value (narrow)

- Keep doing what we you’re doing

Mode 2 creates new value and aggressively ferrets out emerging threats (expansive)

- Extend the boundary of the Enterprise
- Embrace collective learning (learn from events impacting other industries)
- Expand the use of detective and preventive controls

Risk Management Maturity

J. W. Mayo CONSULTING

Level I – Ad Hoc

- Ad hoc processes are inconsistently applied across the organization

Level II – Defined

- Well defined risk management processes
- Qualitative risk metrics

Level III – Quantitative

- Risk governance guides risk management practices
- Organization focuses on risk management effectiveness metrics
- Quantitative risk metrics

Level IV – Optimized

- Fully institutionalized risk management processes
- Extensive use of key risk indicators (KRI)
- Metrics quantitatively demonstrate risk reduction
- Strategy and objectives are fully integrated

J. W. Mayo CONSULTING

Live Content Slide

When playing as a slideshow, this slide will display live content

Poll: What is the risk maturity level of your organization?

joseph.mayo@jwmc-llc.com

BRM – A Heuristic Approach

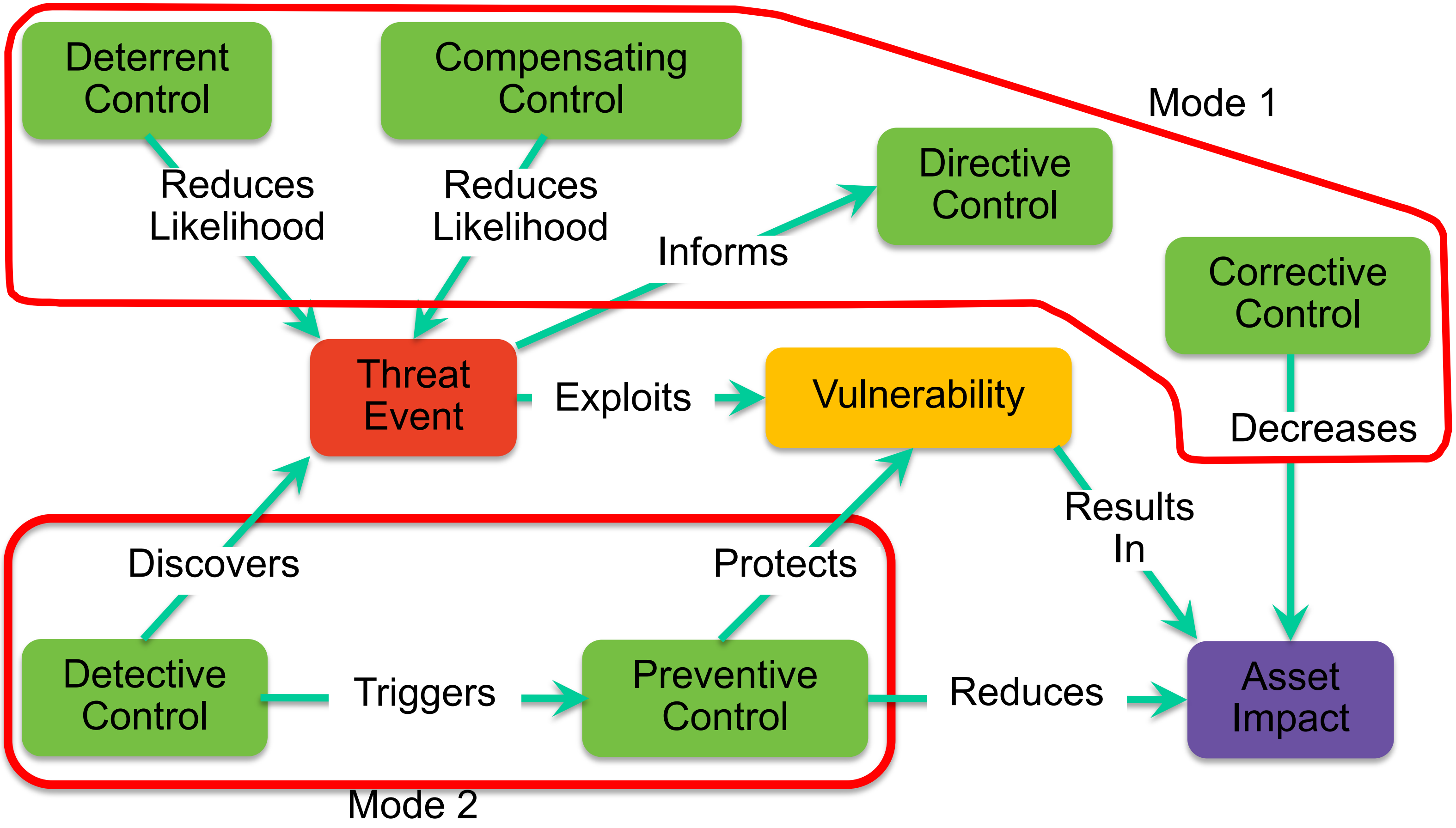
Offensive risk management: a heuristic approach

Heuristic (adjective | heu·ris·tic | \hyu̇-ˈri-stik\)

- Problem-solving by experimental and especially trial-an-error methods
- Exploratory problem-solving techniques that utilize self-educating techniques to improve performance

BRM – A Heuristic Approach

J. W. Mayo
CONSULTING



joseph.mayo@jwmc-llc.com

BRM – A Heuristic Approach

Detective controls provide warnings of policy violations or emerging threats

Mode 1 detective controls

- Audits
- Intrusion detection systems (IDS)
- Motion detectors

Mode 2 detective controls

- Internal password cracking
- Honey pots
- ”Cyber Monday”
- Active participation in industry associations (e.g. Black Hat, US-CERT C^3 Voluntary Program)

BRM – Offensive Risk Management

Preventive controls prevent attempts to violate policy and seeks to prevent asset vulnerabilities from affecting mission accomplishment

Mode 1 Preventive controls

- Sterile procedures in medical environments prevent infection
- Hazard analysis and critical control points (HACCP) prevents food contamination

Mode 2 Preventive controls

- Sponsor collective learning organizations to help identify preventive controls for emerging threats

Strategy and Tactics for the Future

J. W. Mayo CONSULTING

Strategy:

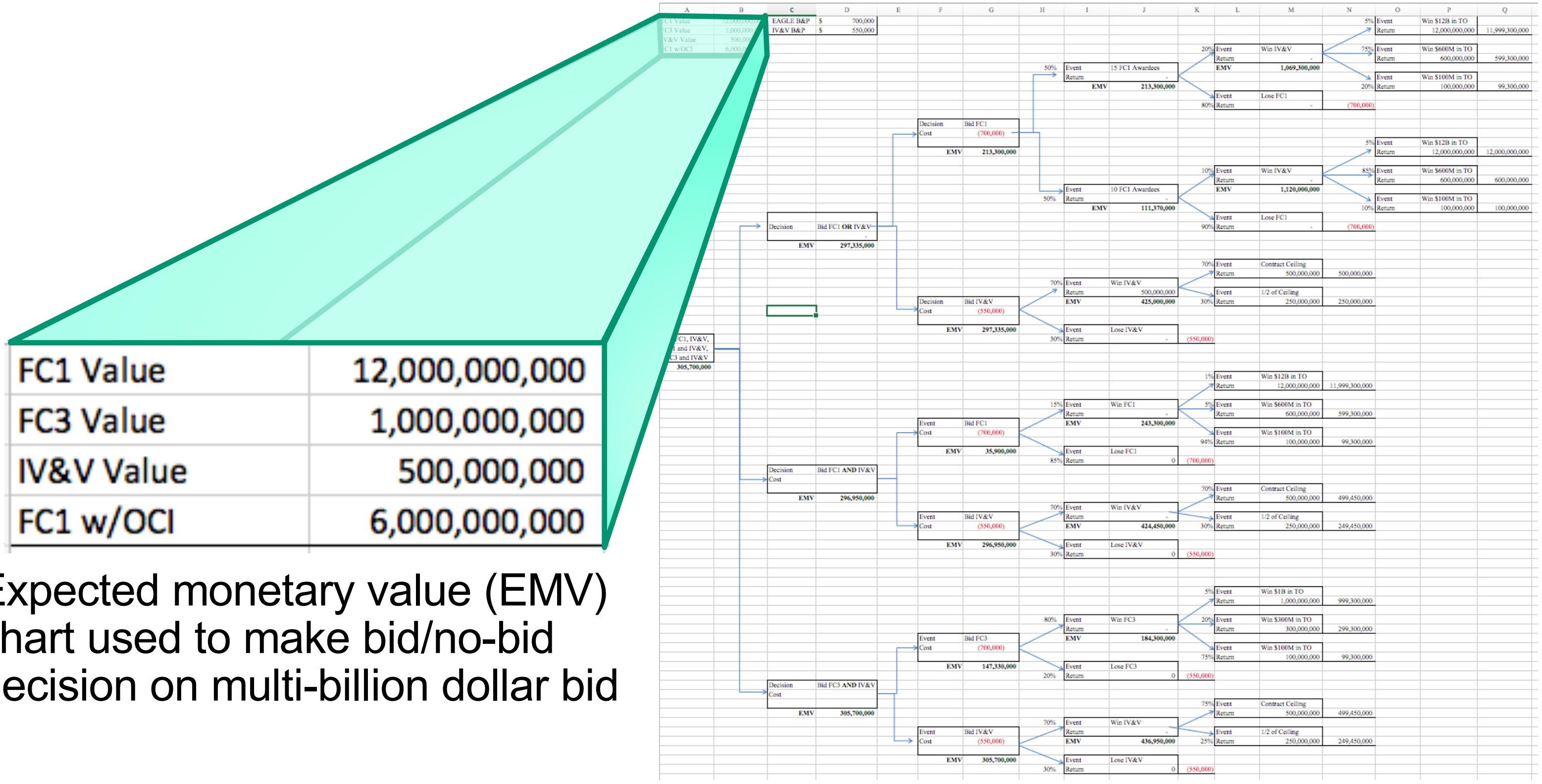
- **Bimodal risk management**
  - Increase use of detective controls
  - Heuristic auditing
  - Go all-in with Mode 2
- **Leverage disruptive technologies to aggressively pursue opportunities**
  - Bots for internal audits; move toward 100% audit
  - Use AI to identify emerging threats
  - Bots for automated reporting and escalation to humans

Tactics:

- **Collective learning**
- **Quantitative risk management**
  - RiskLens
  - Expected Monetary Value (EMV)

joseph.mayo@jwmc-llc.com

Quantitative Risk Management Example



FC1 Value	12,000,000,000
FC3 Value	1,000,000,000
IV&V Value	500,000,000
FC1 w/OCI	6,000,000,000

EAGLE B&P	$	700,000
IV&V B&P	$	550,000

A B C D E F G H I J K L M N O P Q
FC1, IV&V, FC1 and IV&V, FC3 and IV&V 305,700,000
Decision Bid FC1 OR IV&V EMV 297,335,000
Decision Bid FC1 Cost (700,000) EMV 213,300,000
50% Event 15 FC1 Awardees Return - EMV 213,300,000
20% Event Win IV&V Return - EMV 1,069,300,000
5% Event Win $12B in TO Return 12,000,000,000 11,999,300,000
75% Event Win $600M in TO Return 600,000,000 599,300,000
20% Event Win $100M in TO Return 100,000,000 99,300,000
80% Event Lose FC1 Return - (700,000)
50% Event 10 FC1 Awardees Return - EMV 111,370,000
10% Event Win IV&V Return - EMV 1,120,000,000
5% Event Win $12B in TO Return 12,000,000,000 12,000,000,000
85% Event Win $600M in TO Return 600,000,000 600,000,000
10% Event Win $100M in TO Return 100,000,000 100,000,000
90% Event Lose FC1 Return - (700,000)
Decision Bid IV&V Cost (550,000) EMV 297,335,000
70% Event Win IV&V Return 500,000,000 EMV 425,000,000
70% Event Contract Ceiling Return 500,000,000 500,000,000
30% Event 1/2 of Ceiling Return 250,000,000 250,000,000
30% Event Lose IV&V Return - (550,000)
Decision Bid FC1 AND IV&V Cost EMV 296,950,000
Event Bid FC1 Cost (700,000) EMV 35,900,000
15% Event Win FC1 Return - EMV 243,300,000
1% Event Win $12B in TO Return 12,000,000,000 11,999,300,000
5% Event Win $600M in TO Return 600,000,000 599,300,000
94% Event Win $100M in TO Return 100,000,000 99,300,000
85% Event Lose FC1 Return 0 (700,000)
Event Bid IV&V Cost (550,000) EMV 296,950,000
70% Event Win IV&V Return - EMV 424,450,000
70% Event Contract Ceiling Return 500,000,000 499,450,000
30% Event 1/2 of Ceiling Return 250,000,000 249,450,000
30% Event Lose IV&V Return 0 (550,000)
Decision Bid FC3 AND IV&V Cost EMV 305,700,000
Event Bid FC3 Cost (700,000) EMV 147,330,000
80% Event Win FC3 Return - EMV 184,300,000
5% Event Win $1B in TO Return 1,000,000,000 999,300,000
20% Event Win $300M in TO Return 300,000,000 299,300,000
75% Event Win $100M in TO Return 100,000,000 99,300,000
20% Event Lose FC3 Return 0 (550,000)
Event Bid IV&V Cost (550,000) EMV 305,700,000
70% Event Win IV&V Return - EMV 436,950,000
75% Event Contract Ceiling Return 500,000,000 499,450,000
25% Event 1/2 of Ceiling Return 250,000,000 249,450,000
30% Event Lose IV&V Return 0 (550,000)

Expected monetary value (EMV) chart used to make bid/no-bid decision on multi-billion dollar bid

joseph.mayo@jwmc-llc.com

J. W. Mayo CONSULTING

Live Content Slide

When playing as a slideshow, this slide will display live content

Poll: How will robotics and AI change your job five years from now?

joseph.mayo@jwmc-llc.com

Conclusion

Disruptive technologies will drive rapid evolution of unforeseen risk events

Disruptive technologies gives the criminal enterprise greater capability than ever before

Organizations must collaborate globally to cope with the rapid emergence of new threats

- Cooperation has become the optimum survival strategy -- Buckminster Fuller

Extend the boundary of the Enterprise to provide more lead-time to develop internal controls and risk treatment plans

ERM must become more proactive and embrace heuristics

- Chance favors the prepared mind – Louis Pasteur

J. W. Mayo
CONSULTING

Live Content Slide

When playing as a slideshow, this slide will display live content

Social Q&A for ISACA Maryland Chapter Virtual Conference

joseph.mayo@jwmc-llc.com

Thank You!

• • •

Joseph W. Mayo

CMMI Associate, PMP, PMI-RMP, CRISC, RIMS-CRMP

joseph.mayo@jwmc-llc.com

@TaoOfRisk