





NextGen Risk Management

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Don't Tell Me What I Already Know, Tell Me What I Don't Know





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!

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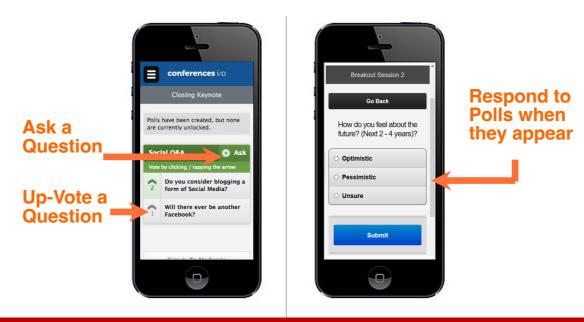
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Note: Responses and submissions are anonymous



Agenda



Introduction

Our World today

- Globalization
- Complexity and Knowability

Problem with Actuarial Approach

- Actuarial Models
- Artificial Intelligence

Scenarios and Discussion

Future of Risk Management

- Bimodal risk management
- Extend boundary of the enterprise
- Fuzzy logic
- Risk hunters





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Poll: How would you characterize your organization's use of disruptive technology?





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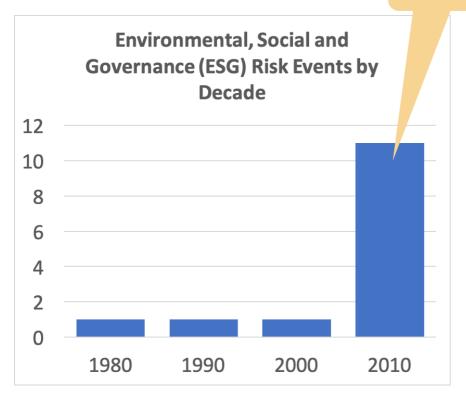
Poll: How concerned are you about risk associated with disruptive technology?





1,000% Increase in the first 8 years of the decade

1,200% Increase in the past 5 years





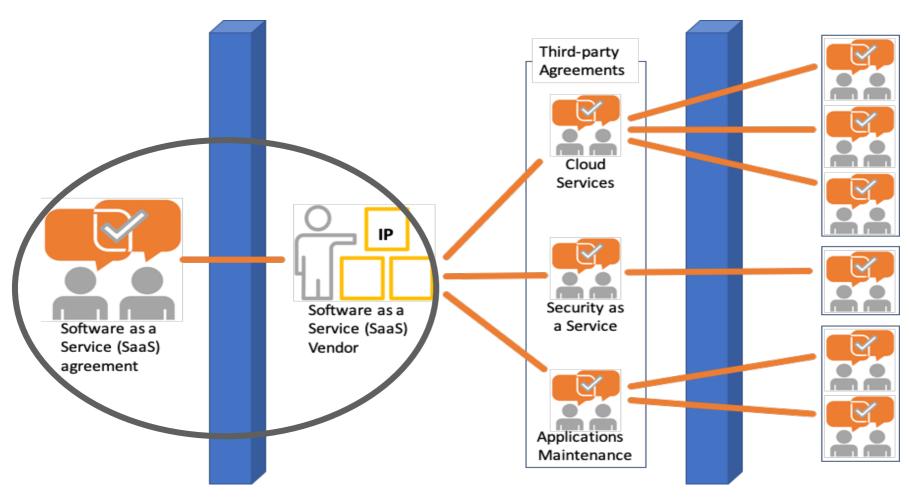




- Knowability is the degree that we are able to know all aspects of a system
- Complexity has four levels
 - Simple fully knowable, easily understandable
 - Complicated fully knowable, difficult to understand
 - Complex not fully knowable but predictable
 - Chaotic neither knowable nor predictable











- Globalization has created infinitely more complex risk environment
- Increased complexity reduces knowability
- Many organizations are rapidly adopting disruptive technologies
- Disruptive technologies + increased complexity + reduced knowability = chaotic systems





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Poll: Does your organization use actuarial models?





- Actuarial models are based on observations over time
 - Mathematical and statistical models to predict outcomes based on past events
- Deterministic models
 - All variables and behaviors are known
- Stochastic models
 - Randomness introduced to some variables





- Risk environment today is at least complex, likely chaotic
- Actuarial models require a high level of knowability
- Actuarial approach nearly guarantees loss events in today's risk environment
 - Catastrophic risk impact has become commonplace



- Actuarial and stochastic models are susceptible to bias
- Disruptive change makes it nearly impossible to collect enough data fast enough to develop effective models
- Model complexity in today's environment is problematic
 - More incorrect than correct answers
 - Tremendous effort required to validate models
 - Delays decision making





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Poll: What is your organization's plan for AI?





- Al can operate beyond the limits of human imagination
- Al will present previously unknown conditions and events
 - DeepMind created never before seen chess strategies in only four hours
 - January 2018, MS and Alibaba Als scored better at reading comprehension than humans



- Al Challenges
 - Al poisoning / adversarial machine learning
 - Adversarial machine learning is a technique that provides samples to a trained learning model that cause the model to misidentify the input
 - Al bias
 - An algorithm produces results that are systematically prejudiced due to erroneous assumptions (either intentional or unintentional) in the machine learning process
 - Different Als produce different results to the same problem
 - Al is very difficult to audit
 - Al bias is difficult to correct





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Poll: Does this information change your perception of actuarial models?





So What Do We Do Now?



Scenarios and Discussion – Anomaly Analysis



World War II Japanese diplomatic code, code named PURPLE

- 40 70 trillion key combinations
- Brute force cracking was impossible
 - Computer has not been invented
 - Key combinations would have to be processed manually
- Japanese transliteration system (ramaji) used to send kanji characters over teletype machines
- American codebreakers noticed romaji anomaly
- Romaji anomaly enabled PURPLE to be cracked in 18 months

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Scenarios and Discussion – Complexity & Knowability



- Networked security system
- 70 systems deployed
- Each system had 2 components that used Rare Earth elements
- We purchased the units from a system integrator, who had subcontractors
- Logistics support was provided by a 3rd party, who had subcontractors
- Manufacturer's stated MTBF 50,000 hours (5 years)
- Integrator's stated MTBF 27,000 hours (3 years)
- Component sparing model was based on 50,000 hour MTBF



Scenarios and Discussion – Complexity & Knowability



Actual MTBF – 13,000 hours (18 months)

30% failed at 3,000 hours (3 months)



Rare Earths are frequently mined on demand

Rarity results in six month + lead time

Three countries control 2/3 of the World's Rare Earth reserves

China, Russia and Brazil

In 2017 China, Russia and Brazil produced 87% of the world's Rare Earths

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Scenarios and Discussion – Complexity & Knowability



Some things to consider:

- Can our Rare Earths be sourced in the 13% that was mined outside of Russia, China, and Brazil?
- Are there any reliable news sources that monitor labor or geopolitical problems in Russia, China, or Brazil.
- What is the chance of trade relation issues with Russia, China, and Brazil?
- Are transportation routes from Rare Earth mines subject to piracy or hijacking?
- The number and cost of contingency components required to weather at least a 12-month delay.
- Status of currency futures for countries with Rare Earth mines

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Future of Risk Management



Make decisions with incomplete, inaccurate and obfuscated information

Embrace fuzzy logic

Make decisions based on anomalies and emerging trends

Extend the boundary of the enterprise

Embrace collective learning

Go on the offensive

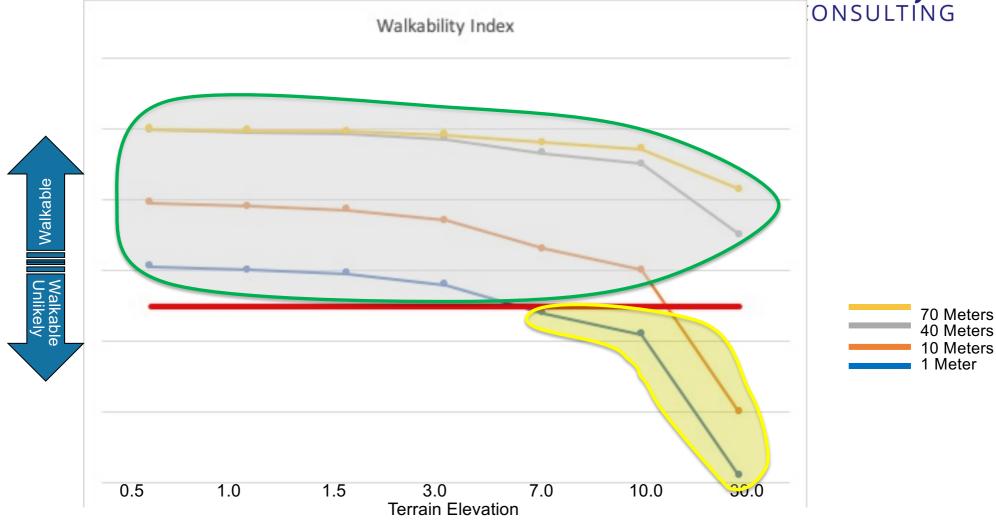
- Use risk hunters to identify emerging unknown-unknowns
- Use Bots to collect information globally

Use actuarial science for process improvement and KRI



Fuzzy Logic





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Collective Learning



Active collaboration amongst all stakeholders (e.g. regulators, competitors, suppliers, vendors, etc.)

Problem solving studies indicate that collective learning facilitates discovery and implementation of unpredicted solutions¹

Complex organizations that operate in high risk environments leverage collective learning to survive

- Nuclear power plant industry
- Aeronautical industry

1 Jeong I, Shin SJ. High-Performance Work Practices and Organizational Creativity During Organizational Change: A Collective Learning Perspective. Journal of Management. 2019;45(3):909-925.





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Poll: Has this presentation changed your perception of risk associated with disruptive technology?





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Social Q&A for ISACA Maryland Chapter Virtual Conference





Thank You!

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