



Emerging Risks

CAS Spring meeting
May 20, 2019 3:20-4:35 pm
Max J. Rudolph, FSA CFA CERA MAAA





Survey of Emerging Risks

- **Annually since 2008**
- **Sponsored by Joint Risk Management Section**
 - Canadian Institute of Actuaries (French translation)
 - Casualty Actuarial Society
 - Society of Actuaries
- **Mix of quantitative and qualitative**
- **Expect full report to be released in late summer**

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**Survey of Emerging Risks
5 Categories**


- **Economic**
- **Environmental**
- **Geopolitical**
- **Societal**
- **Technological**

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Survey of Emerging Risks
23 Risks (Slide 1 of 2)

Economic	Environmental
<ul style="list-style-type: none">• Energy price shock• Currency shock• Chinese destabilization• Asset price collapse• Financial volatility	<ul style="list-style-type: none">• Climate change• Freshwater loss• Tropical storms• Earthquakes• Severe weather

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Survey of Emerging Risks
23 Risks (Slide 2 of 2)

Geopolitical	Societal
<ul style="list-style-type: none">• Terrorism• Weapons of mass destruction• Interstate/civil wars• Failed and failing states• Transnational crime• Globalization shift• Regional instability	<ul style="list-style-type: none">• Pandemics• Chronic diseases• Demographic shift• Liability regimes/regulations

5 **Technological**

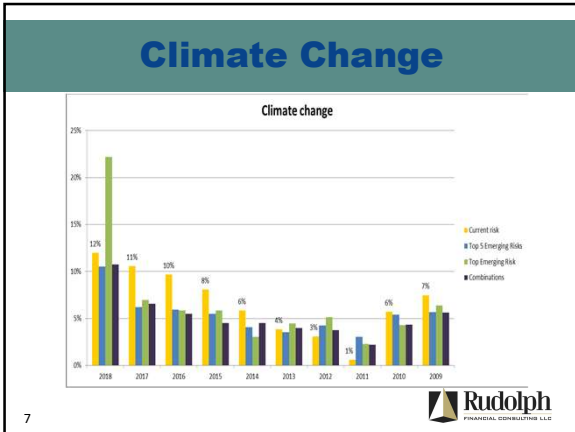
- Cyber
- Technology



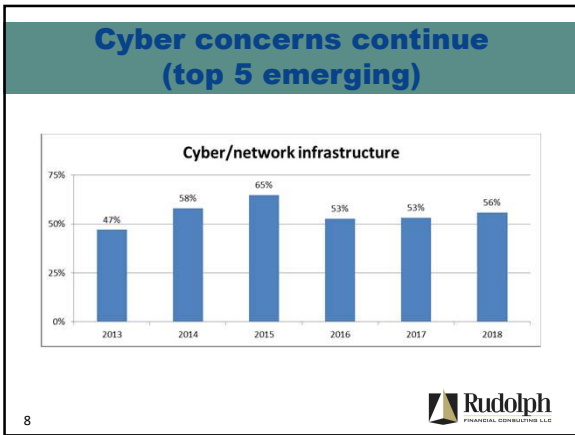
Questions Asked

- **Current risk**
- **Top 5 emerging risks**
- **Top emerging risk**
- **Emerging risk combinations**

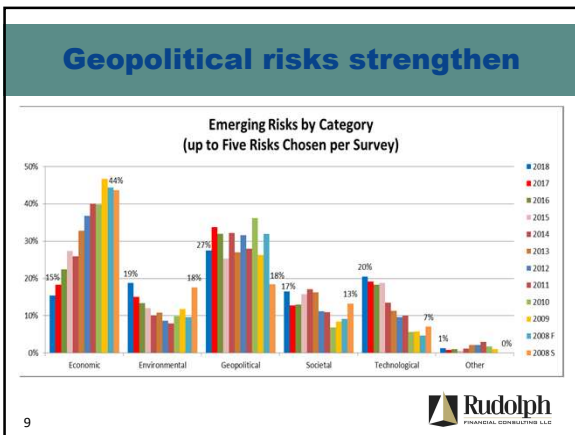
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Top Current Risks


- **Climate change (12%)**
- **Cyber/network infrastructure (12%)**
- **Financial volatility (11%)**
- **Asset price collapse (8%)**
- **Technology (7%)**



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Top (5) Emerging Risks Over Time


Year	2015	2016	2017	2018
1	Cyber/network infrastructure	Cyber/network infrastructure	Cyber/network infrastructure	Cyber/network infrastructure
2	Financial volatility	Financial volatility	Terrorism	Climate change
3	Terrorism	Terrorism	Technology	(Disruptive) Technology
4	Asset price collapse	Technology	Regional instability	Demographic shift
5	Regional instability	Retrenchment from globalization	Asset price collapse	Financial volatility



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Top Emerging Risks


- **Climate change (22%)**
- **Cyber/network infrastructure (15%)**
- **Technology (13%)**
- **Financial volatility (5%)**
- **Demographic shift (5%)**



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Top Risks in Combination

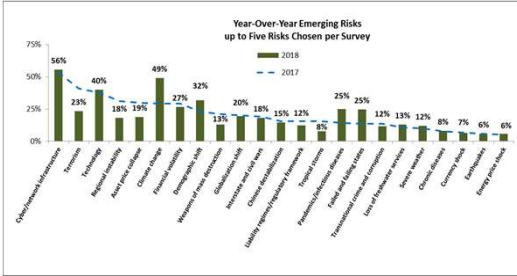
- **Climate change (11%)**
- **Cyber/network infrastructure (9%)**
- **Financial volatility (8%)**
- **Asset price collapse (7%)**
- **Technology (7%)**




Changes from prior year

Year-Over-Year Emerging Risks up to Five Risks Chosen per Survey

■ 2018 - - 2017

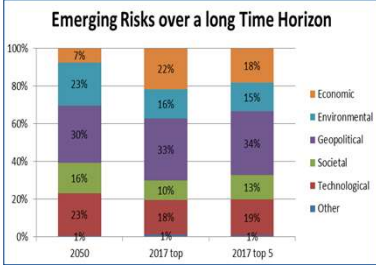


Risk Category	2018 (%)	2017 (%)
Climate change	56%	40%
Financial volatility	23%	18%
Asset price collapse	40%	19%
Technology	18%	27%
Cyber/network infrastructure	49%	32%
Other	22%	13%
Environmental	13%	20%
Geopolitical	18%	15%
Societal	15%	12%
Economic	12%	25%
Other	25%	12%
Environmental	12%	13%
Geopolitical	13%	12%
Societal	8%	7%
Economic	7%	6%
Other	6%	6%




Extended time horizon – 2050

Emerging Risks over a long Time Horizon



Year/Category	Economic (%)	Environmental (%)	Geopolitical (%)	Societal (%)	Technological (%)	Other (%)
2050	7%	23%	30%	16%	23%	1%
2017 top	22%	16%	33%	10%	18%	1%
2017 top 5	18%	15%	34%	13%	19%	1%



Polling Question

- Which risk are you most worried about?
 - Energy price shock
 - Currency shock
 - Natural catastrophes: tropical storms
 - Natural catastrophes: earthquakes
 - Chronic diseases

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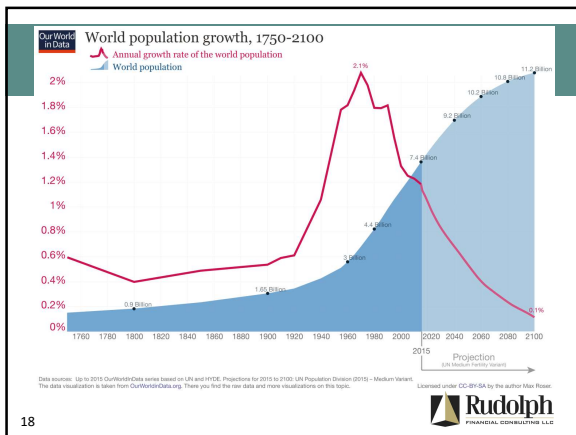


Polling Question

- Which risk is least likely to impact humanity?
 - Climate change
 - Demographic shift
 - Loss of freshwater services
 - Pandemics/infectious diseases

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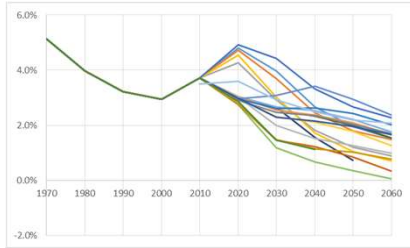




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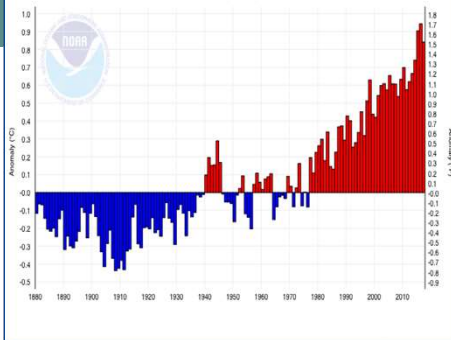
Global GDP Growth Scenarios



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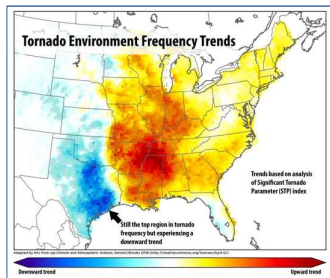
Global Land and Ocean Temperature Anomalies, January-December



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Unexpected Outcomes



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Change is not Linear

GLOBAL CONVEYOR BELT
Slowing with Climate Change

- Greenland melt flows into Atlantic
- Ocean becomes less salty
- Water sinks more slowly

WHY IT MATTERS:

- Higher East Coast sea level
- Fewer nutrients for fish
- Stronger coastal storms

CLIMATE CENTRAL

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To access surveys/articles

<https://www.soa.org/research-reports/2015/research-emerging-risks-survey-reports/>

Articles based on the Survey of Emerging Risks
SOA blog for Canadian members

ERM practitioners' advice for the next generation
<https://www.soa.org/Files/Research/Projects/erm-lessons-master.pdf>

How a risk team adds value
<https://blog.soa.org/2019/02/22/how-a-risk-team-adds-value/>

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Thank you!
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