Degrees of Randomness (Mandelbrot)

1. Proper mild randomness (the normal distribution)
2. Borderline mild randomness: (the exponential distribution with $\lambda=1$)
3. Slow randomness with finite and delocalized moments
4. Slow randomness with finite and localized moments (such as the lognormal distribution)
5. Pre-wild randomness (Pareto distribution with $\alpha=2 - 3$)
6. Wild randomness: infinite second moment (Variance is infinite. Pareto distribution with $\alpha=1 - 2$)
7. Extreme randomness: (Mean is infinite. Pareto distribution with $\alpha<=1$)
Five Types of Risks

Emerging

Mundane  Disruptive  Dangerous  Wild
Mundane Risks

- Risks that might create losses that at worst would mean a bad quarter
  - Frequency from low to moderate
  - High frequency losses are just bad management
- Most operational risks of insurers
- Very small lines of business
- Very secure investment classes
- Small investment positions

- These are presenting risks – i.e. they might cause losses this coming year
Disruptive Risks

- Risks that might result in a loss that wipes out a full year’s profits
  - But unlikely that the loss will result in a significant reduction of Surplus
  - In a well diversified insurer, many risks might fall into this category
    - If management is conscious of their risk profile, it might be a strategy to limit exposures so that this happens
    - If management is not conscious of their risk profile, it might happen that concentrations develop and exposures drift to the high end of this category and beyond
- One approach would be to have a rule that no risk would be allowed to surpass this level without approval by the board
  - Requiring that management be conscious of their risk profile

- These are presenting risks – i.e. they might cause losses this coming year
Dangerous Risks

- Risks that might result in losses that could mean a significant reduction of surplus in adverse conditions
  - This requires either or both of a large concentration of risk and a fat tail of the loss distribution (i.e. high losses are more likely)
  - Concentration happens when an insurer’s strategy is focused on a narrow range of risk taking
    - Or when just one part of strategy works much better than the rest
  - Taking too much fat tailed risk might happen because remote loss potential is misunderestimated
    - Common Stock Risk prior to Dot Com and Financial Crisis
    - Multiple medium Tor/Hail storms
    - Max loss from a Hurricane (Katrina, Maria)
    - May be acerbated by failure of mitigation approach
- When you have both problems, insolvency can result
- These are presenting risks – i.e. they might cause losses this coming year
Wild Risks

- Risks that can **change the world**
  - We tend to discount these completely, but many of them pass the test that they have actually happened before
  - Ultra low frequency and/or long latency period
    - Pandemic
    - Major Earthquake
    - Meteor strike
    - Climate Change
    - Ocean pollution
  - If they happen, they are total game changers

- Some of these are presenting risks – i.e. they might happen this coming year
  - Long latency risks are often contingent upon the continuation of some trend
Emerging Risks

- Risks that are not expected to create any losses this year
- Usually we do not actually know the likelihood of losses from these risks
  - As far as severity goes, we have our imagination
- As Max in covering this topic in detail, I will not spend any more time on it.
- Instead, I will focus on Disruptive, Dangerous and Wild Presenting risks
Dangerous Risks Survey

- In late 2016, we reached out to over 1000 insurance professionals. Mostly Willis Re North America clients, analytical staff and brokers
- We asked one simple question:
  “Which risk of these two risks presents the most danger to your organization in the coming year?”

- We used the wiki survey platform

- We started with a list of about 60 risks
  - We got them from combining the top 20 risks of 10 insurers that we work with (and eliminating duplicates)
Which of these two risks presents more danger to your organization in 2019?

Strategic Direction & Opportunities Missed

Unethical Use of Data

I can't decide

9,152 votes on 50 ideas

Add your own idea here...
Resulting Article on Willis Towers Watson Wire

2017’s most dangerous risks for insurers
# Dangerous Risks

<table>
<thead>
<tr>
<th>2019 Rank</th>
<th>Risks</th>
<th>2018 Rank</th>
<th>Risks</th>
<th>2017 Rank</th>
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<td>IT</td>
<td>2</td>
<td>Pricing / Product Line Profit</td>
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<td>5</td>
<td>Runaway Claims</td>
<td>5</td>
<td>Underwriting</td>
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## Dangerous Risks

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<td>Disruptive Technology</td>
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<td>Business Operations Failure</td>
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<td>Natural Catastrophe</td>
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<tr>
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<td>10</td>
<td>Underwriting</td>
<td>10</td>
<td>Emerging Risks</td>
</tr>
</tbody>
</table>
2019 Dangerous Risks - Commentary

1. **Strategic direction and opportunities missed**  
   *(up from number three in 2018)*
   - The crystal ball is cloudy. It seems that many firmly agree that a change in direction is coming for the industry, but it is unclear what that new direction will be. Few felt confident in their own ability or their management’s ability to make all the right choices for their companies’ future directions.

2. **Cybersecurity and cybercrime**  
   *(down from number one in both 2017 and 2018)*
   - Cyber remains a top risk, though it lost its number one ranking this year. Perhaps this reflects the growing availability of internal skills and external insurance options. Or perhaps it is a mark of unrealistic optimism. One respondent notably mentioned that the overemphasis on cyber risk at the expense of other risks was a new danger.

3. **Pricing and product-line profit**  
   *(up from number four in 2018)*
   - Swiss Re estimated global catastrophe losses in 2018 to be less than half the level of 2017. However, pricing and product-line profit is still seen as a major danger to insurers for 2019.
What use is this?

Context for Max’s discussion of Emerging Risks
- These are the presenting risks
- Max will now talk about Emerging

A standard to look at when you are updating your risk register
- If your top risks are different from the poll results can you justify the difference?
- Are there any risks on this list that you should consider adding to your list?
- And to be clear, I am not recommending that you change your priorities or the risks on your list
  - I am suggesting that this Dangerous Risks list can be used as a challenge to your thinking
  - I would expect that you would make few if any changes, but occasional challenge is healthy
Five Types of Risks

Emerging

Mundane  Disruptive  Dangerous  Wild

Presenting
Five Types of Risks

Emerging

Mundane Disruptive Dangerous Wild

Presenting
Wild Risks

1. Extreme Climate Change
2. Nuclear War
3. Global Pandemic
4. Ecological Catastrophe
5. Global System Collapse
6. Major Asteroid Impact

Source: 12 Risks that threaten human civilization, Cambridge
Wild Risks

Super-volcano  Synthetic Biology  Nanotechnology

Artificial Intelligence  Unknown Consequences  Future Bad Global Governance
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