

MANAGING EXTREMES

Willis Re

EMERGING RISKS MANAGEMENT FOR INSURERS



Humanity



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“The real problem with humanity is the following: We have Paleolithic emotions; medieval institutions; and god like technology.”

2009 Dr. E.O. Wilson,
Harvard University



Source: The Watchman's Rattle, Thinking Our Way Out of Extinction,
Rebecca D. Costa, 2009 Vanguard Press, Kindle Edition

Definition



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Emerging risks are risks which may develop or which already exist that are difficult to quantify and may have a high loss potential. Further, emerging risks are marked by a high degree of uncertainty; even basic information, which would help adequately assess the frequency and severity of a given risk, is often lacking.

Examples of such risks include climate change, asbestos liabilities, genetic engineering and nanotechnology.

From CRO Forum (2005)

Unknown Unknowns

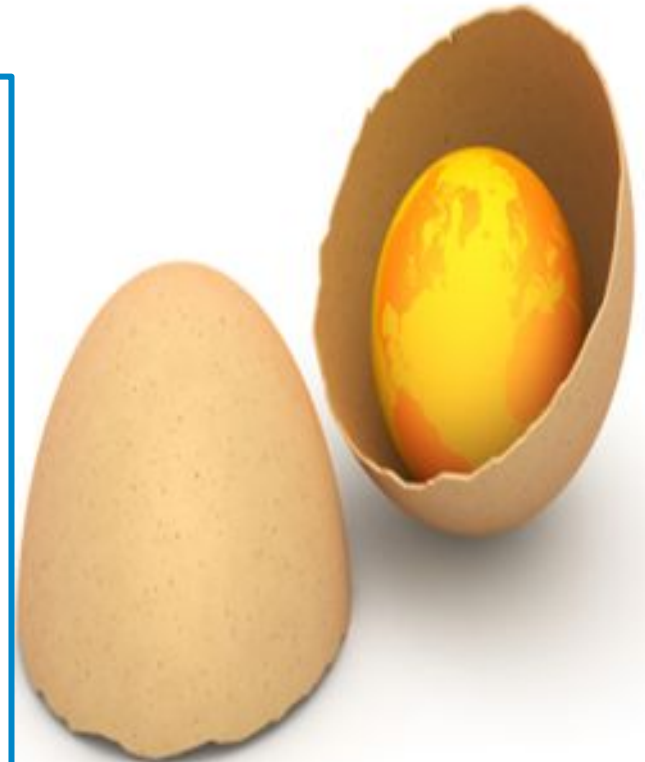


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“ [T]here are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns – there are things we do not know we don't know. ”

Former United States Secretary of Defense
Donald Rumsfeld



Black Swan Nassim Taleb



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"What we call here a Black Swan (and capitalize it) is an event with the following three attributes.

- First, it is an outlier, as it lies outside the realm of regular expectations, because nothing in the past can convincingly point to its possibility.
- Second, it carries an extreme 'impact'.
- Third, in spite of its outlier status, human nature makes us concoct explanations for its occurrence after the fact, making it explainable and predictable."



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HOW TO FIND EMERGING RISKS

Expert Predictions about the Future



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"Stocks have reached what looks like a permanently high plateau."

Irving Fisher, economics professor at Yale University, 1929.

"I think there is a world market for maybe five computers."

Thomas Watson, chairman of IBM, 1943.

"We will bury you."

Nikita Krushchev, Soviet Premier, predicting Soviet communism will win over U.S. capitalism, 1958.

"It will be gone by June."

Variety, passing judgment on rock 'n roll in 1955.

"It will be years - not in my time - before a woman will become Prime Minister."

Margaret Thatcher, future Prime Minister, October 26th, 1969.

"Reagan doesn't have that presidential look."

United Artists Executive, rejecting Reagan as lead in 1964 film The Best Man.

Low frequency / High Severity
Earthquake + Tsunami +
Nuclear



50 Possible Emerging Risks



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- Business model change
- Competitor activity
- Corruption & fraud
- Currency wars
- Free market obstructions
- High unemployment/underemployment
- Housing bubble
- Hyperinflation
- Increased moral hazard (following contracts, etc.)
- Low interest rates
- Management culture
- Market complexity
- Market crash
- Massive international bond defaults
- Meltdown of derivatives markets with counterparty failures
- Meltdown of reinsurance markets with counterparty failures
- New distribution channels / methods of distribution
- New market entrants with drastically different objectives and methods
- No-growth (or negative growth) economic scenario
- Prolonged very low interest rates
- Restructure/default of U.S. National Debt
- Risk of radical changes in workplace expectations/norms for either employers or employees
- Sovereign Default
- Strategically Important Financial Institutions
- Systemic risk of collapse
- Tax Policy changes
- Trade Wars
- US debt crisis
- US Fiscal and Monetary Policy
- Rising financial inequality
- Regime change
- Unemployment
- Unfunded Social Programs
- Unsustainable Medicare Benefits
- US entering war like in Iraq
- US loses world dominance
- US severe loss of credit standing
- World war III
- Collapse of Euro
- Consistently low investment returns
- Deflation
- Deleveraging
- Employee engagement
- Excessive private debt
- Financial security system breakdown
- Global depression
- Impact of unfunded entitlement programs
- Social Security breakdown
- Bedbugs
- Cell phone radiation

Another 50 Possible Emerging Risks



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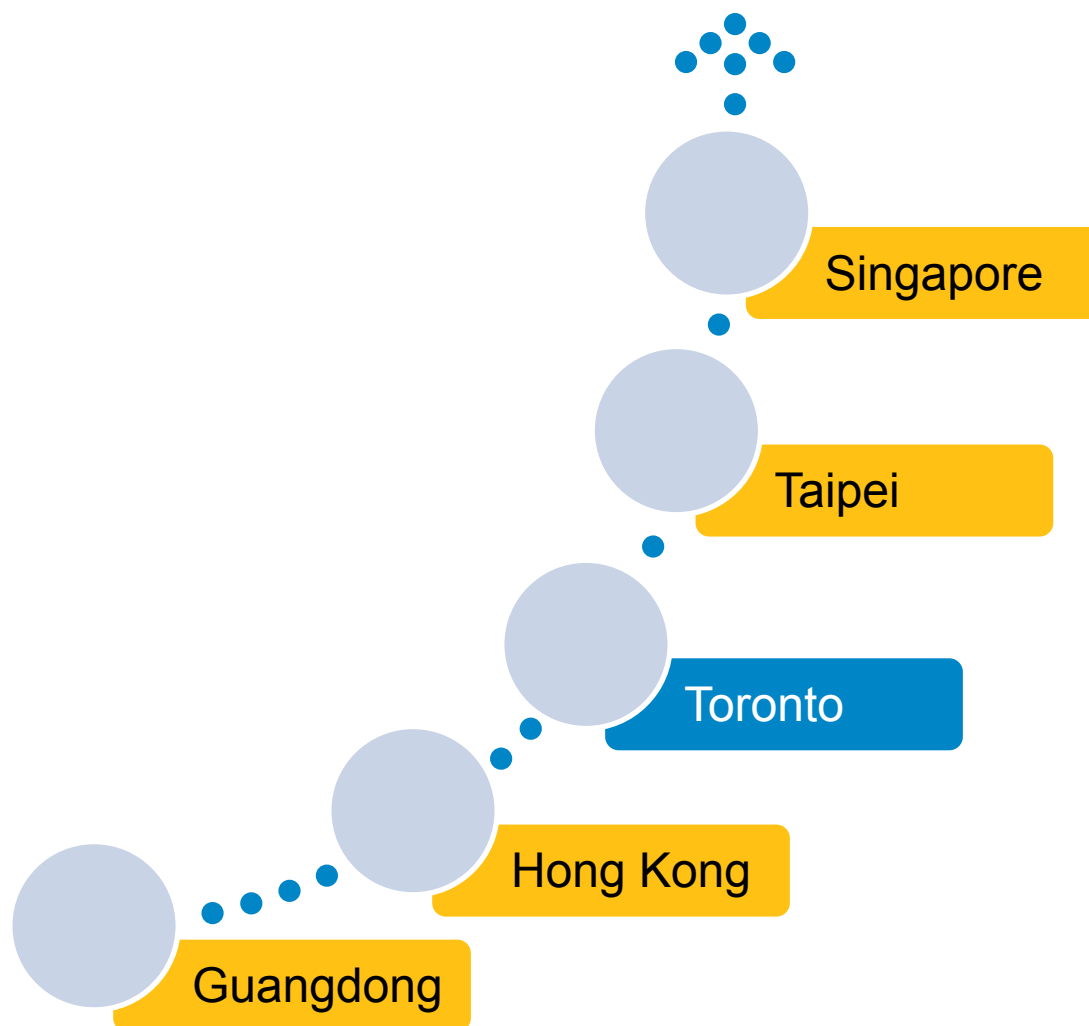
- Climate change
- Food additives (growth hormones)
- Food production's impact on freshwater and general food supply.
- Fracking risks
- Fragility of electrical power grid (US and Canada)
- Implementation of carbon tariffs, taxes, or similar
- Antibiotics lose effectiveness
- Natural Catastrophe: Drought
- Natural Catastrophe: ALL Storms, not just tropical
- Natural resource depletion
- Overpopulation
- Sharp rise in middle class (India & China)
- Pandemic
- Soil degradation/permanent loss of food growing capacity
- Space Debris
- Space Weather
- Volcanic ash
- Famine
- Changes in regulatory and financial regimes
- Continued growth in government power
- Derivative limitations
- Rise of the neo States
- Director and Officers liability expansion
- Freeze of political process
- Government debts & overspending
- Medical advances
- Impacts of government regulation (ex: Health Care Reform)
- Ineffective governmental response to crises
- Loss of trust in government/institutions (" Occupy movement")
- Political climate changes
- Political risk
- Regulatory burden increases
- Regulatory complexity
- Shifting world economic power to China
- Increase in widespread adoption of socialism/communism
- Accelerating governmental costs
- Affordability and access to basic and higher education
- Civil Unrest
- Class shift
- Consumer personal DNA/genome access
- Loss of confidence/motivation in the 1st world countries
- Loss of freedom
- Social networking misuse
- Stress-related diseases
- Terrorism
- Adequate training to meet technological needs
- Cyber hactivism - the use of cyber terrorism as an instrument of political influence and/or control
- Hacker attacks / cyber crime
- Nanotechnology
- New combination of smaller events

What do these five cities have in common?



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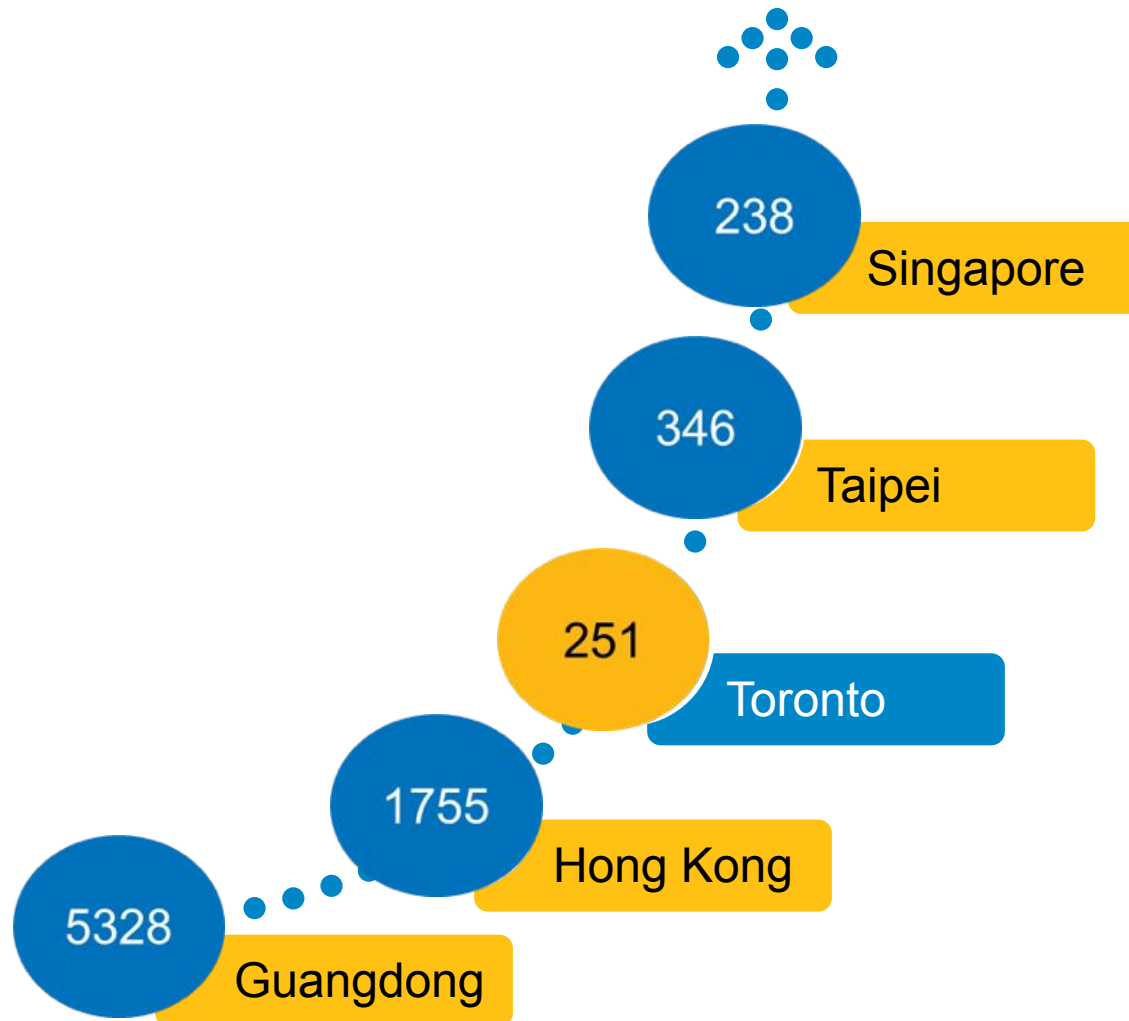


SARS (2002 – 2003)



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Awareness of potential Emerging Risks



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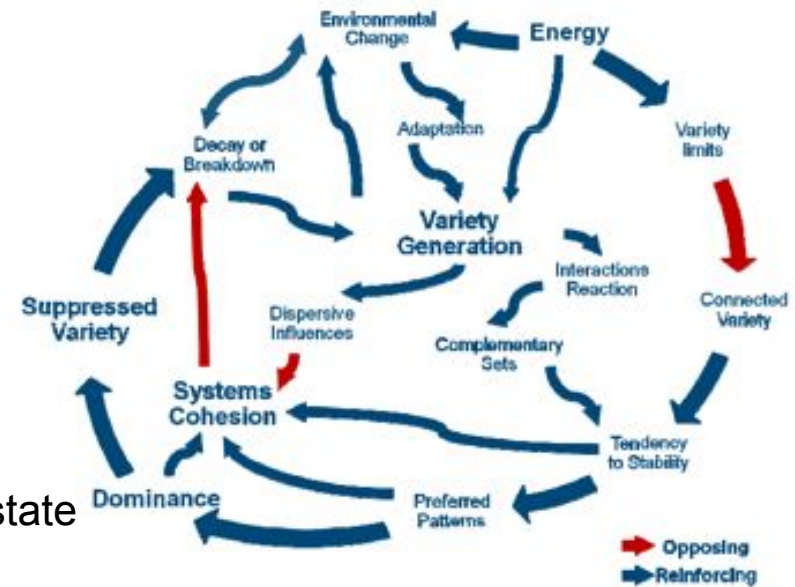
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- Changing trends – the difference between regression to mean and continuation to failure
- Very infrequent events – historical record may not be useful
- Cascading failure – small adverse event creates other problems until there is a major crisis
- Slow macro trends- some problems, like demographic issues, develop over a generation
- Tipping points – like the sudden movement in congress regarding immigration and gay marriage. Suddenly the river changes direction.



Systems Analysis

- Feedback Loops
 - Positive Feedback Loop
 - Usually massive growth of one or several elements
 - Negative Feedback Loop
 - Slide into failure
 - Balancing Feedback Loop
 - Factors will bring system back to “normal” state
- System Constraints
 - Limits of sub systems
- Complex Adaptive Systems
 - System is difficult to analyze as it is always changing in response to prior experiences
 - Most systems involving humans are Complex Adaptive Systems



Summary

Identifying Emerging Risks



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1. Be careful of experts
2. Consider combinations of events
3. Think outside the box
4. Consider lots and lots of possibilities
5. Things may be hidden by accounting model
6. Look at things happening far away
7. Use Systems Thinking

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EVALUATING EMERGING RISKS

Emerging Risk Evaluation




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- Likelihood – often very difficult because emerging risk have rarely or never happened before
- Impact – most common – use stress and scenario tests to evaluate
- Velocity – how fast will potential change into actual? How much time will you have to react? Can everyone fit into the lifeboats if they all leave their bunks at the same time?





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Picture of a Stress Test

Examples of Stress Tests

AM Best SRQ



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- **Market Risk:**
 - Stocks: Losses equal to peak to trough of 2008 crash
 - Interest rates shift by 2.0% which has happened once every 8 years over the past 50 years.
- **Underwriting Risk**
 - Catastrophe: Experience a catastrophic loss at 1/100 level per cat model
 - Reserves: Experience excess loss development equal to worst one year loss development in past __ years
 - Pricing: Experience underwriting loss equal to worst combined ratio for past __ years for two largest lines of business at the same time.
- **Credit Risks** A reinsurer fails and it was the largest unsecured reinsurer.
- **Operational Risk**
 - Fraud by investment manager resulting in loss of 10% of funds under management.
 - IT data security breach which results in release of sensitive customer data for all personal lines clients and costs from fines and remedies for individuals
 - Employee class action lawsuit
 - Misplace the largest claims resulting in unexpected jump in claims as well as penalties for late payments
- **Liquidity Risk** Experience Underwriting and Operational losses described above and must pay out while interest rates move by 2% and must raise any funds needed by selling bonds that have dropped in value
- **Strategic Risk** New competitor takes away 50% of sales with new and innovative product and/or sales strategy. Company is unable to cut fixed expenses immediately.

Lloyd's RDS



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- Florida Windstorm
- Gulf of Mexico Windstorm
- European Windstorm
- Japanese Windstorm
- California Earthquake
- New Madrid Earthquake
- Japanese Earthquake
- UK Flood
- Terrorism
- Marine
- Loss of Major Complex
- Aviation Collision
- Satellite Risks
- Liability Risks
- Political Risks

Mixture of Historic and Synthetic
Single Event Scenarios

Lloyd's RDS Terrorism Scenario



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Summary

Evaluating Emerging Risks



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- Only evaluate emerging risks with either:
 - high impact, high velocity, or some frequency knowledge
- Don't stress over Frequency
- Evaluate Severity with Stress and Scenario Tests
 - Use mostly Bottom up Synthetic Scenario Tests
- Be careful not to over generalize from stress test results
- Use Systems Thinking to assess Risk Velocity

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MONITORING EMERGING RISKS

Selecting Risks for Monitoring



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- Based upon assessments, which risks are...
 - Potentially disruptive to company plans
 - Potentially disastrous to earnings expectations
 - Potentially ruinous to company continuation
- If you do anticipate these risks
 - Will that give you an advantage over your competitors?
- If you do not anticipate these risks
 - Will your competitors have an advantage over you?

Risk Velocity



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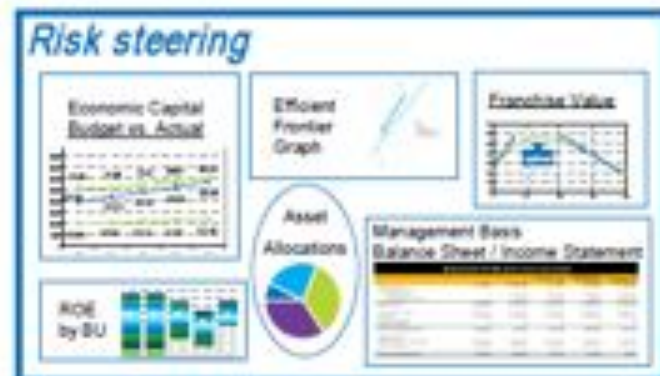
- Emerging Risks with expected high velocity
 - Monitoring may be less effective
 - May want to concentrate on Action Plans
- Emerging Risks with lower velocity
 - May be able to identify KRIs that give good warning
 - Allow time to recognize emergence and adapt or develop action plans based upon specific circumstances





Key Risk Indicators

- When able, measure the risk to track exposure
- When unable to measure – track KRIs
 - Forwards, Backwards, Inwards, Outwards



Key Risk Indicators Pandemic Risk



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FORWARD

Trend current experience forward to project possible situation in 6 months

BACKWARD

Compare recent experience with historical at different stages of progression of Pandemic.

INWARD

Count of infections from own claim and underwriting experience.

OUTWARD

Count of infections from all territories, even where you don't do business.

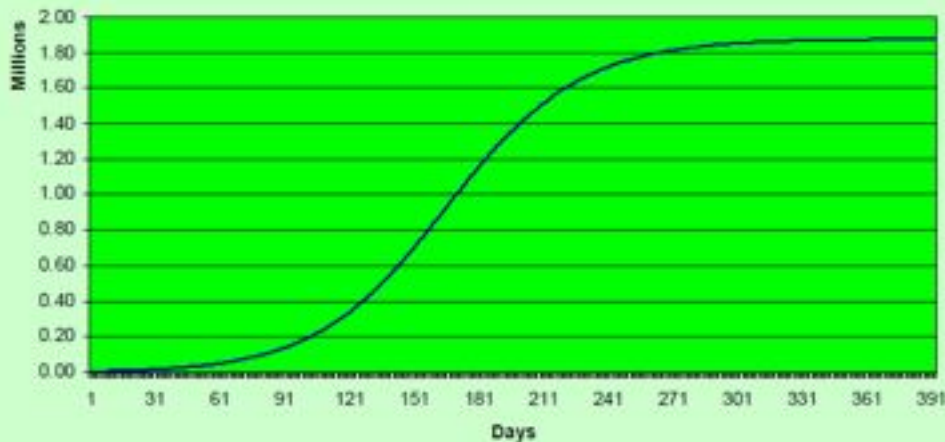
Key Risk Indicators Pandemic Risk



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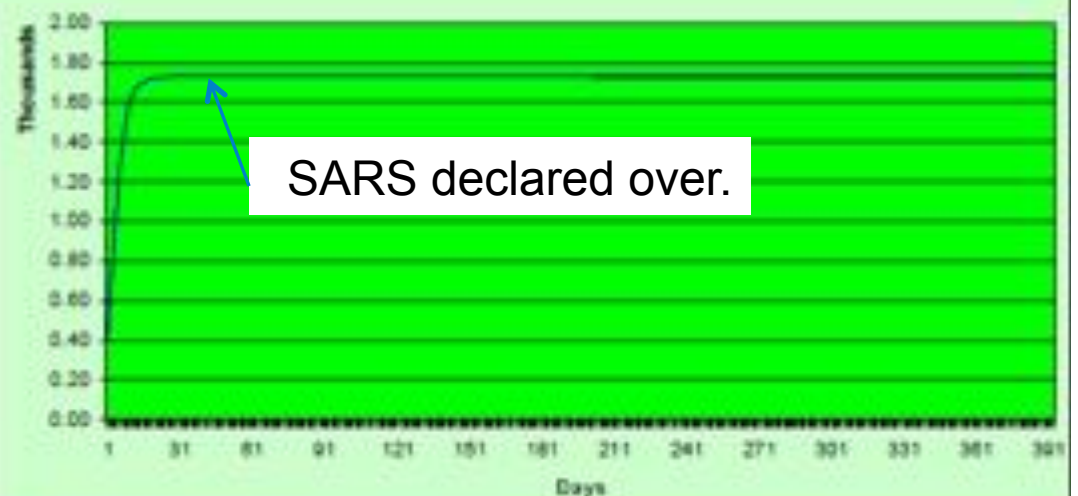
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Cumulative Projected
Number of Infections
SARS Hong Kong



← Projection April 3

Cumulative Projected
Number of Infections
SARS Hong Kong



Actual June →

SARS declared over.

Source: Milliman

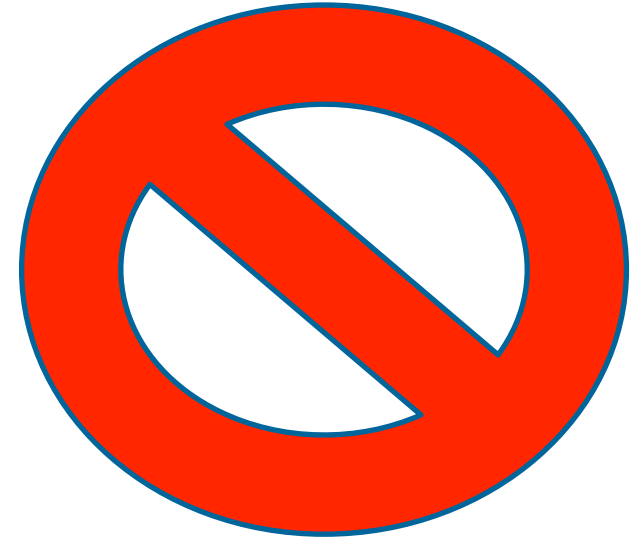
What Happened to SARS?



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- Hong Kong health authorities took action.
 - Instituted quarantine of infected individuals *and* their families
- SARS was 1/1000th as bad as the early model said that it could be.
- **Key Risk Indicators** were effective in helping the health authorities to make the right call.



Summary

Monitoring Emerging Risks



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- Be selective to choose risks to monitor
- Select Key Risk Indicators
 - May not be able to directly monitor risk
 - Looking for indications of increasing likelihood
 - Look Forward, Backward, Inward, Outward for KRI's

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PLANNING ACTIONS

Examples of Responses for Insurers



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internal

- adjustment of product strategy,
- adjustment of underwriting strategy,
- identification of improved investment possibilities,
- strengthening of know-how in product, underwriting, investment, etc. areas by bringing in new staff,
- additional capital resources for higher and riskier business volume,
- increased peer review

external

- using consultants to increase know-how in certain areas including pricing of new coverages,
- reinsurance for difficult to assess, rare or new, "unknown" and "difficult to quantify risk",
- alternative risk transfer solutions such as catastrophe bonds, market wide pooling of otherwise uninsurable risks,
- joint ventures to leverage common resources,
- joint market effort and/or regulatory effort to bring down systemic market risks

Resistance to Advance Actions



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- Advance actions usually have a direct or indirect cost
- Costs may be required before likelihood of emerging risk becomes clear

“Let’s put this off until it becomes clearer that we need it”



Summary

Planning Actions



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- There are many choices for potential actions
 - An advance plan means the difference between a **FLIGHT, FIGHT, FREEZE** reaction and a reasoned planned response
- There will be False Positives
- Need to continually update your views
 - Practice

Conclusions



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- Consideration of Emerging Risks is important.
 - It is a real risk management discipline
 - Not just staring out the window

Five Steps in Emerging Risks Management Process

1. Find Emerging Risks
2. Evaluating Emerging Risks
3. Monitoring Emerging Risks
4. Planning Actions
5. Taking Actions when needed

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