LLOYD'S

EMERGING RISKS

LIABILITY ISSUES

2 September 2008

TREVOR MAYNARD

Agenda

- Emerging risks team: Why? and what we do
- Climate change
  - Refresher on the science
  - Impacts on insurers
- Nano technology: what is it and why should we worry
- Pandemic: Wider impacts and liability implications

EMERGING RISKS TEAM

WHY? AND WHAT WE DO

EMERGING RISK:

“An issue that is perceived to be potentially significant but which may not be fully understood or allowed for in insurance terms and conditions, pricing, reserving or capital setting”

EMERGING RISK TEAM:

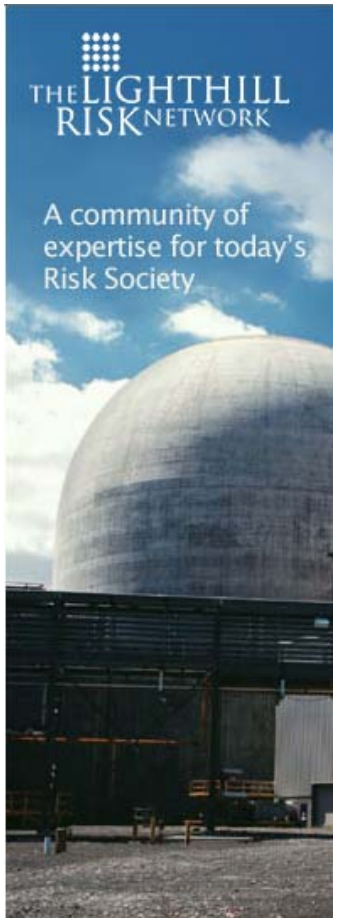
“To ensure that the Lloyd’s market is aware of potentially significant emerging risks”

Ideas behind the team

- Emerging risk now a core capability
  - FSA – financial risk outlook
  - Rating agencies
- Special interests group
  - Experts from the Lloyd's market
  - Capable of thinking outside the box
  - Lloyd's team an "extra" resource for you – adding value
- Academics/ Government – useful information!
- Outputs: Lloyds.com, papers, seminars

Lighthill Risk Network

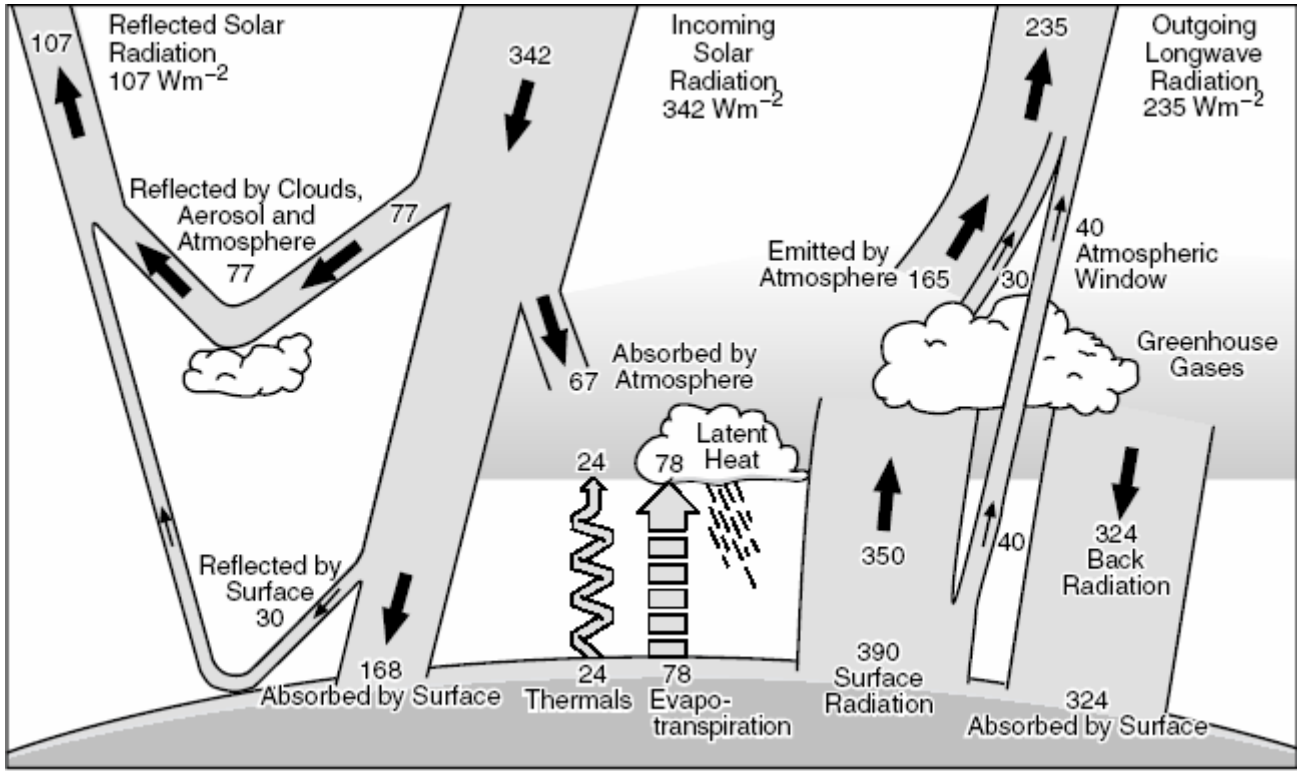
- Major initiative with other core members
  - Lloyd's, Benfield, Guy Carpenter, Catlin
- Bridge between academia and industry
- Working Closely with Research Councils in the UK
- Has held several conferences on risk areas of interest to insurers:
  - Nanotechnology
  - Risks in a digital world
  - Climate Change
  - http://www.lighthillrisknetwork.org



CLIMATE CHANGE

QUICK REFRESHER ON THE SCIENCE

Greenhouse Gasses

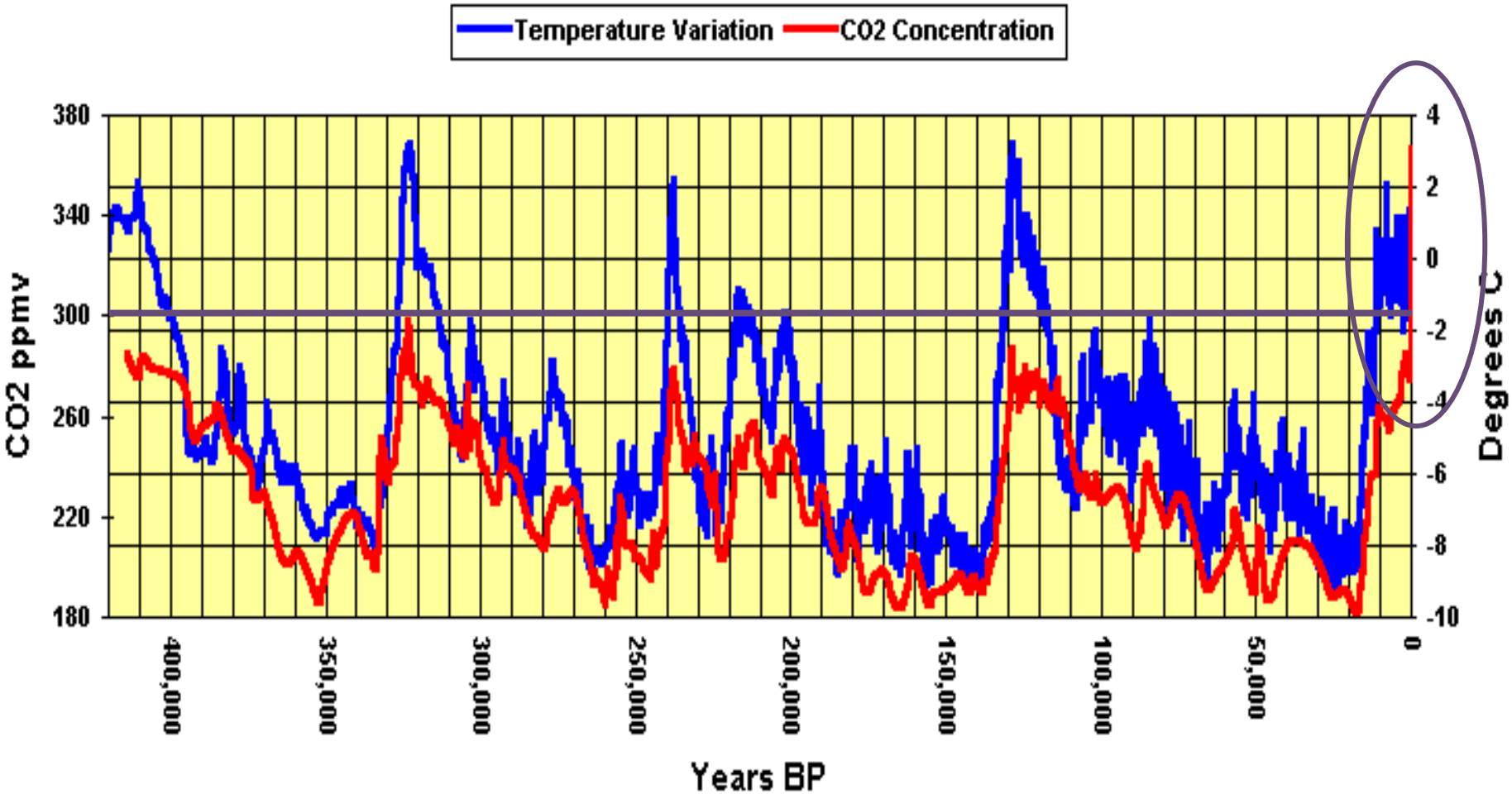


Source: Kiehl and Trenberth, 1997:

Greenhouse Gasses

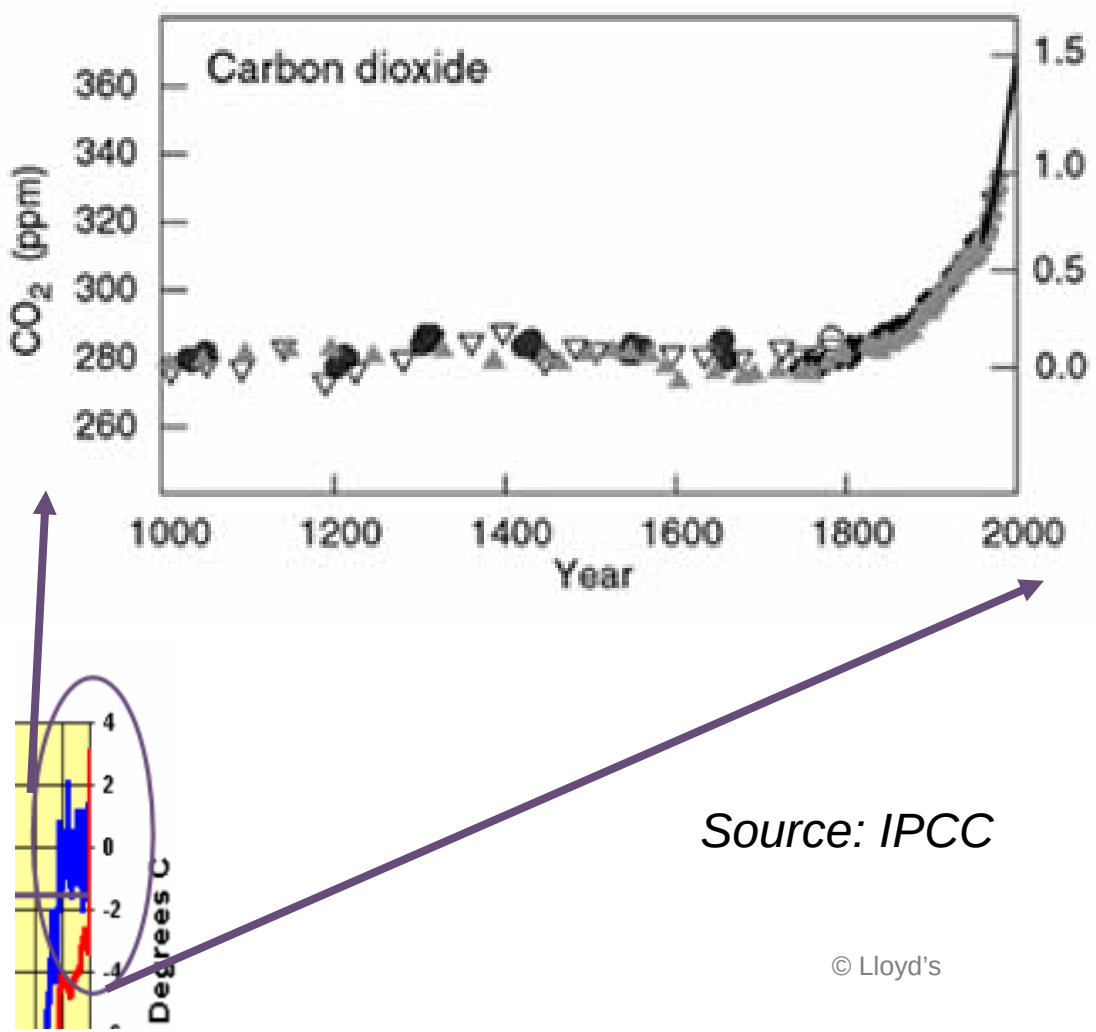
Greenhouse gases	Chemical formula	Pre-industrial concentration	Concentration in 1994	Atmospheric lifetime (years)***	Anthropogenic sources	Global warming potential (GWP) *
Carbon-dioxide	CO_2	278 000 ppbv	358 000 ppbv	Variable	Fossil fuel combustion Land use conversion Cement production	1
Methane	CH_4	700 ppbv	1721 ppbv	12,2 +/- 3	Fossil fuels Rice paddies Waste dumps Livestock	21 **
Nitrous oxide	N_2O	275 ppbv	311 ppbv	120	Fertilizer industrial processes combustion	310
CFC-12	CCl_2F_2	0	0,503 ppbv	102	Liquid coolants. Foams	6200-7100 ***
HCFC-22	$CHClF_2$	0	0,105 ppbv	12,1	Liquid coolants	1300-1400 ***
Perfluoromethane	CF_4	0	0,070 ppbv	50 000	Production of aluminium	6 500
Sulphur hexa-fluoride	SF_6	0	0,032 ppbv	3 200	Dielectric fluid	23 900

Greenhouse Gasses – further back



Greenhouse Gasses – recent past

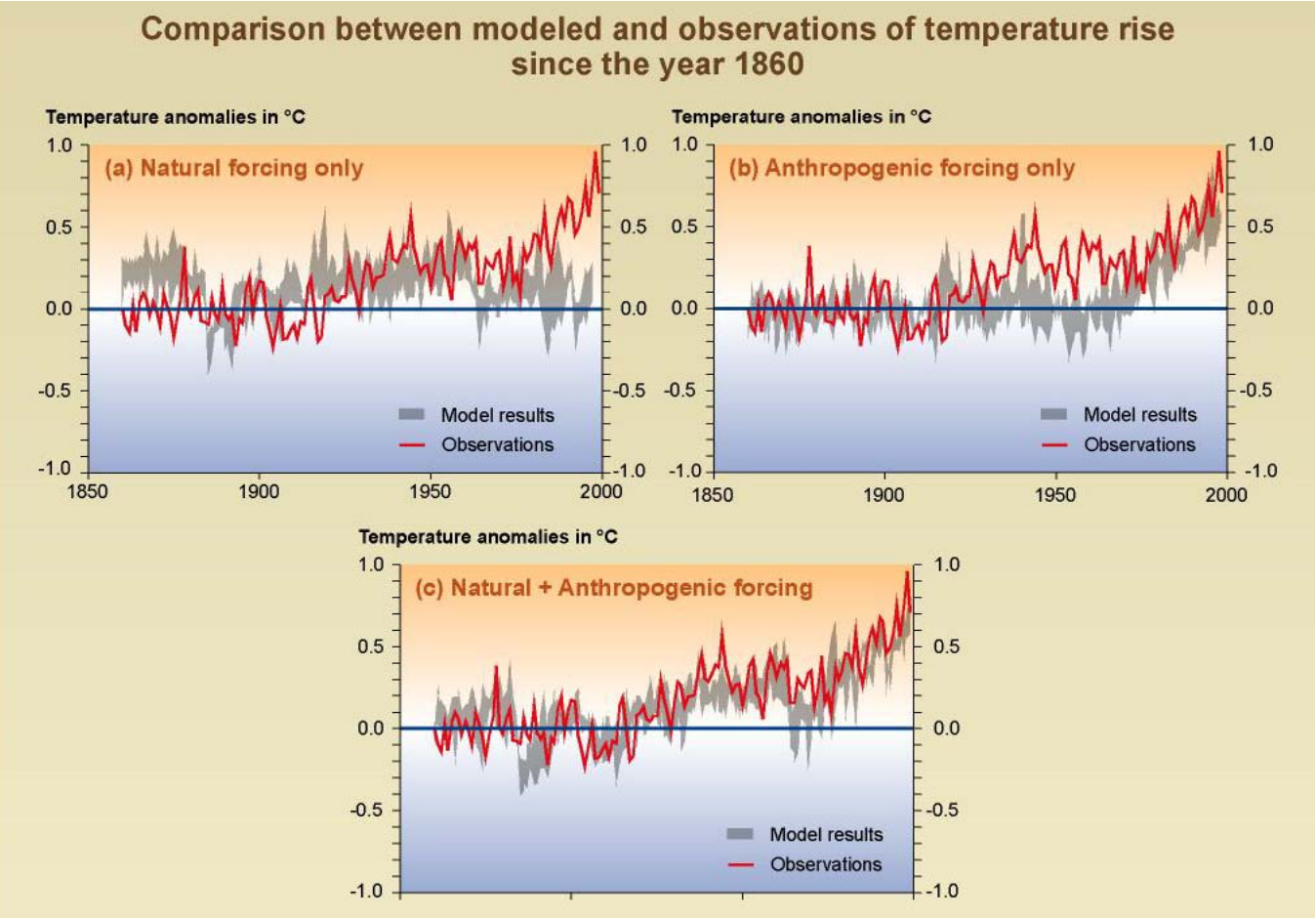
- 280ppm to 380ppm in 150 years
- 31% above pre-industrial levels
- Proxy data before 1800
- Anthropogenic (man made)



Source: IPCC

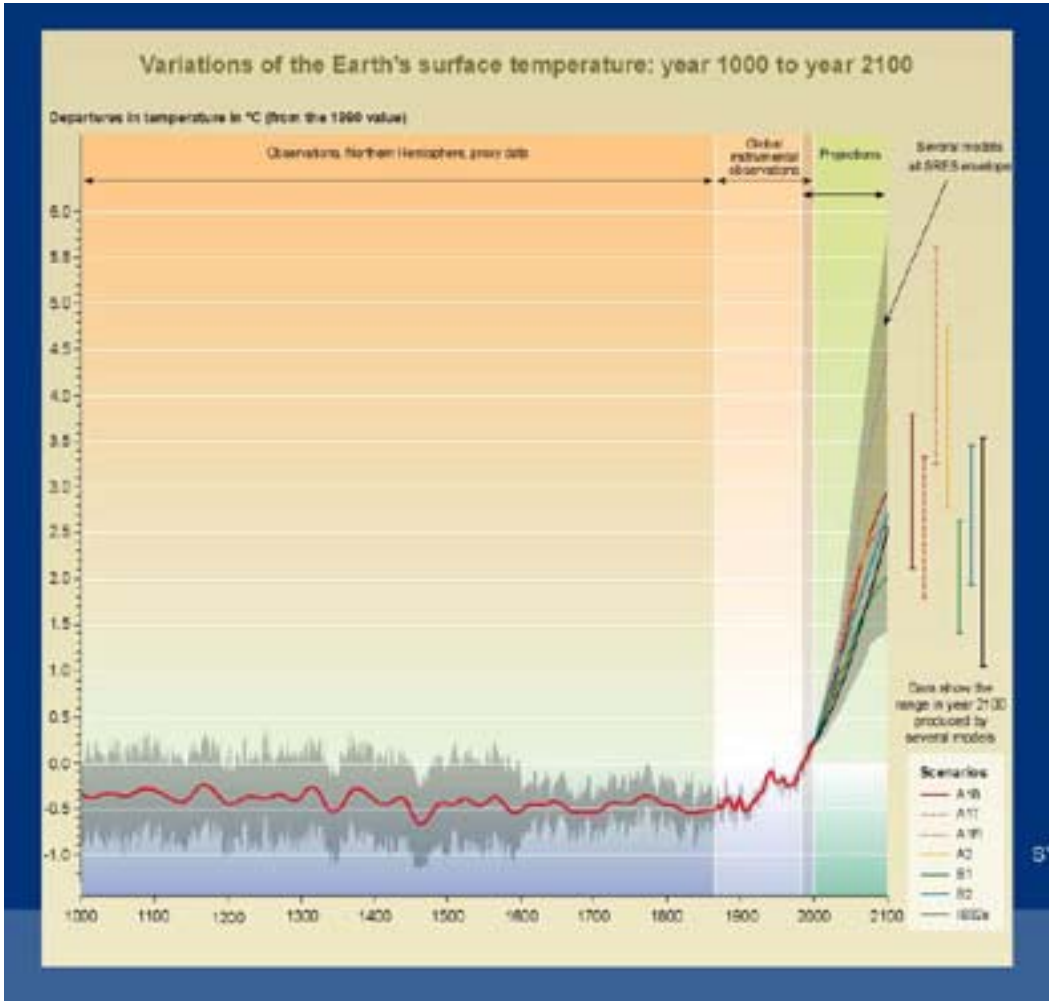
FACT - MANKIND'S ACTIVITIES ARE A MAJOR CAUSE OF CLIMATE CHANGE.

Temperatures – are man-made



Source: IPCC

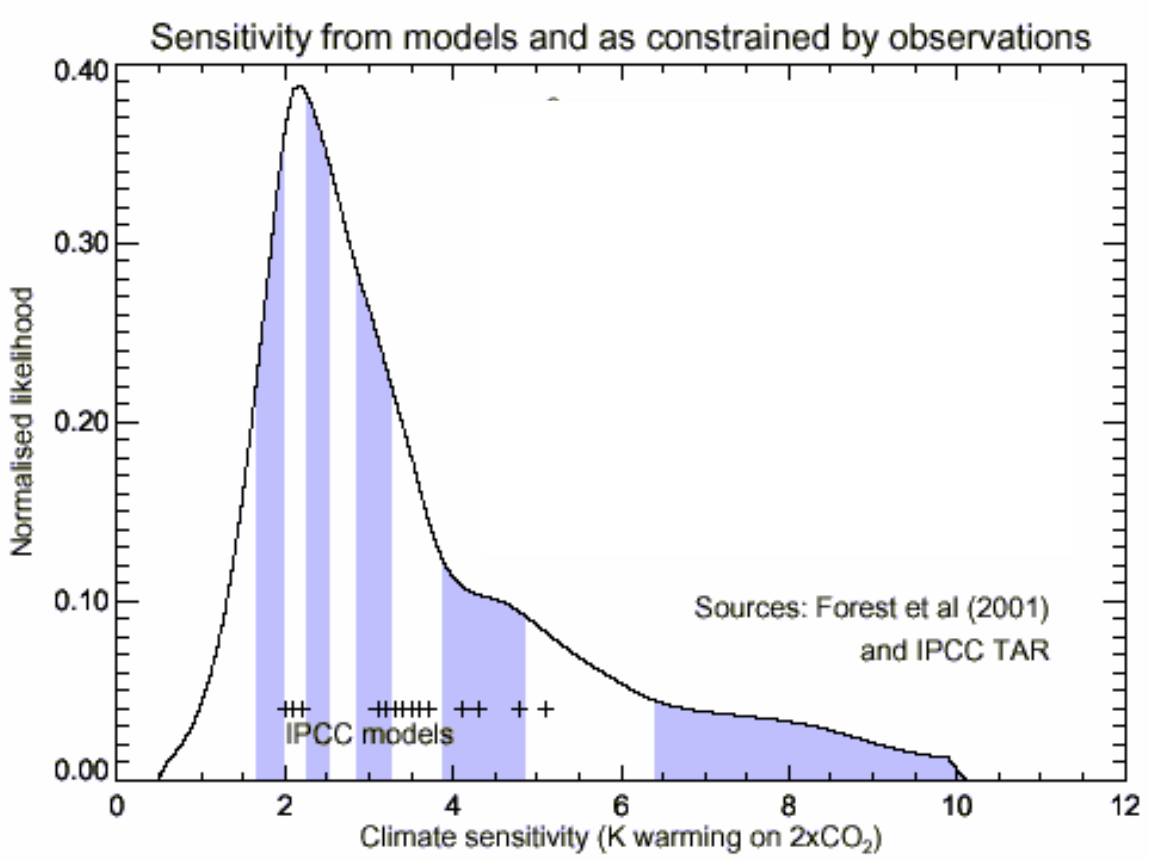
Temperatures – projections…..



…..but

Chaos applies to climate models….

- Parameter and model risk
- Ensembles!
- Robust planning



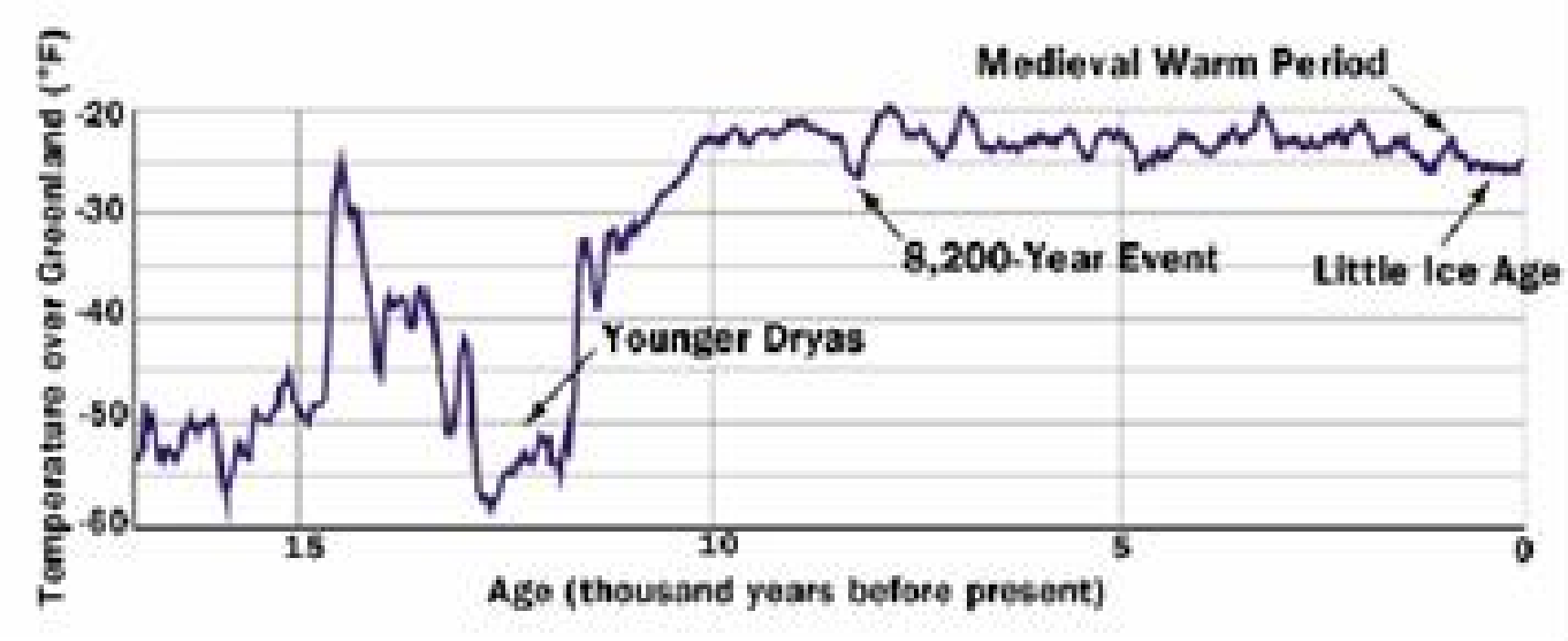
climateprediction.net

Temperatures

- 1990s warmest decade (Northern Hemisphere) in 1000 years
- 1998 the warmest year in 1000 years.
- 2003 (summer) hottest in Europe since 1500 (at least)
  - "*human influence doubled the risk*" (Allen et al, 2005)
  - Attribution methods being developed
- 21st century projected temp rise - fastest in 10000 years.

THE PAST CLIMATE WAS MUCH MORE VARIABLE THAN WAS THOUGHT.

Rapid change….



- 8° C within 15 years (at poles)
- Hanson: 5 meters sea level rise by 2100? (IPPC <95cm)

CLIMATE CHANGE

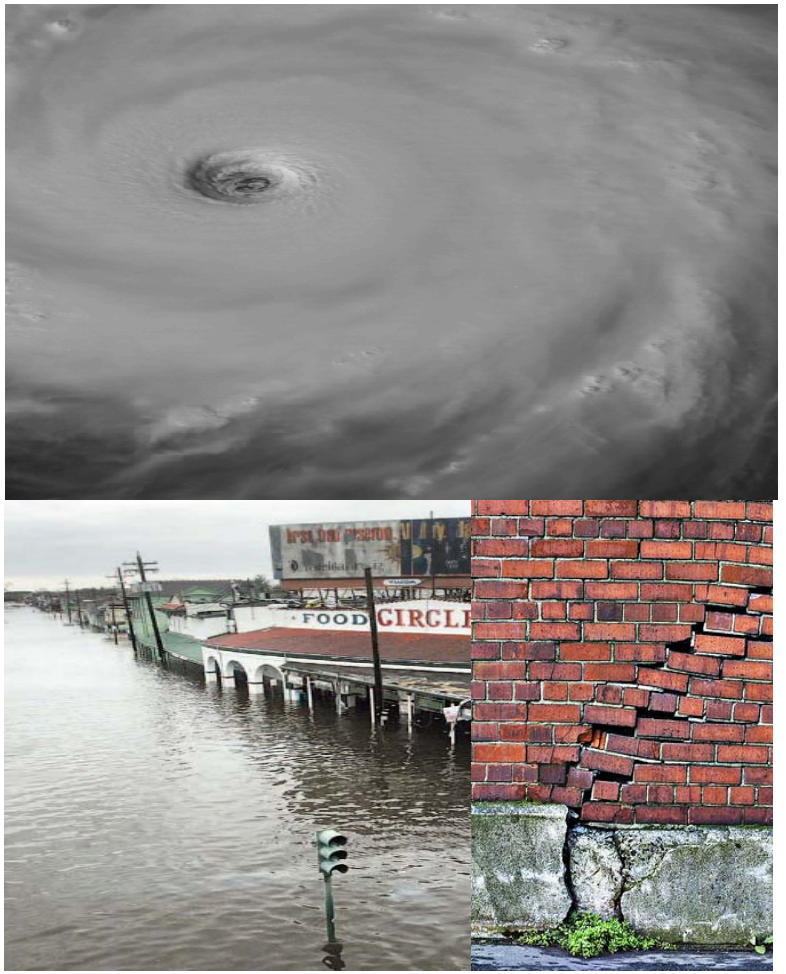
IMPACT ON INSURERS

“Models are based on past experience and it is likely that over time this experience will become out of date due to all manner of trends. When such trends start to emerge, agents should consider their impact on the results. ***It is not acceptable to wait until the effects of the trend are well understood before commenting*** *on the possible implications.”*

LLOYD’S ICA GUIDANCE 2008

Property Damage

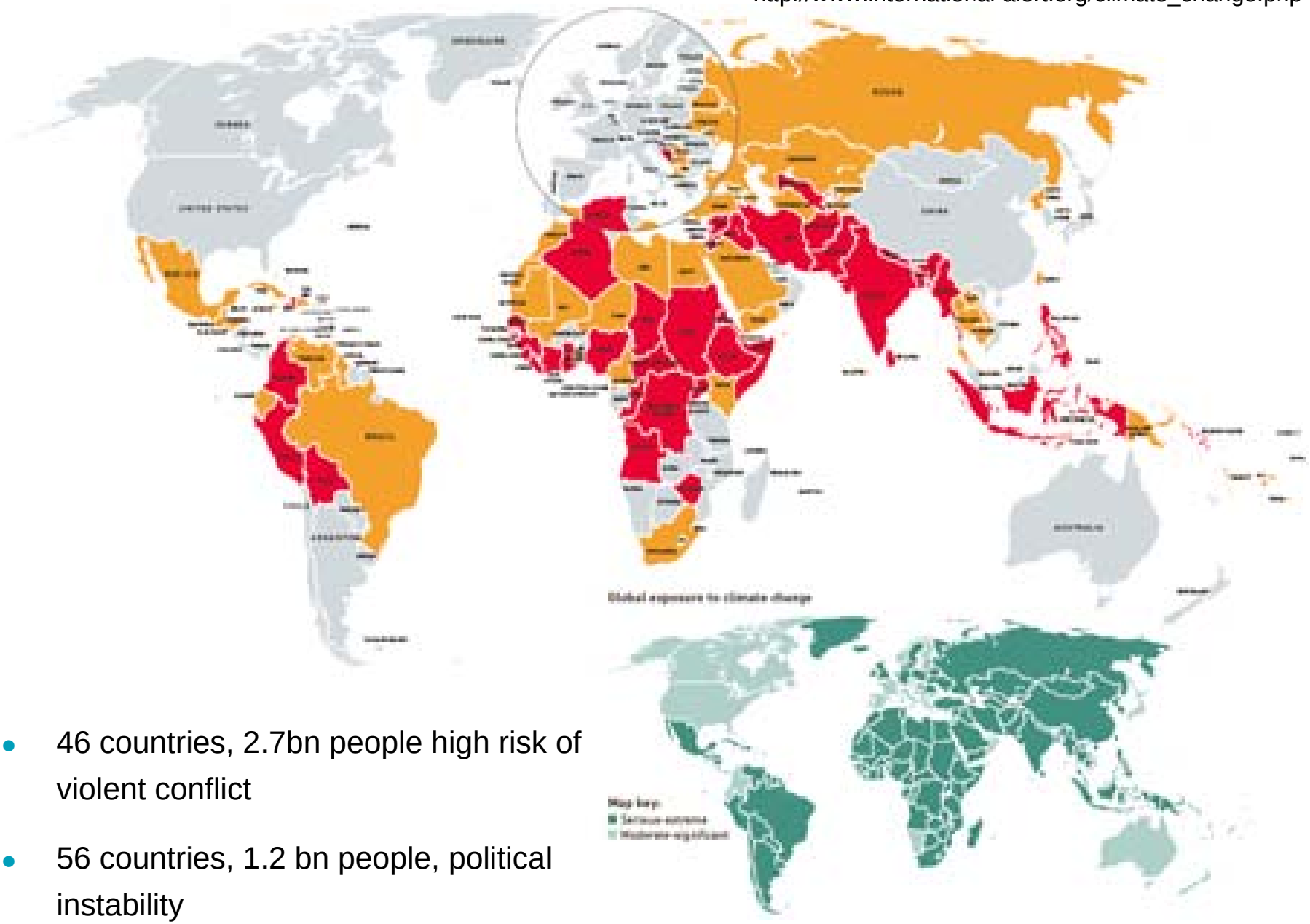
- Wind damage
- Flood
  - Storm surge (sea level higher)
  - River
  - Flash
- Subsidence
- Business interruption (IVAN)
- Fire (Bark beetles)



Political Risk

- Covers: Seizure of property, contract frustration etc
- Tensions likely to increase globally
  - Water disputes
  - Energy shortages
  - Loss of land/ migrations

http://www.international-alert.org/climate_change.php

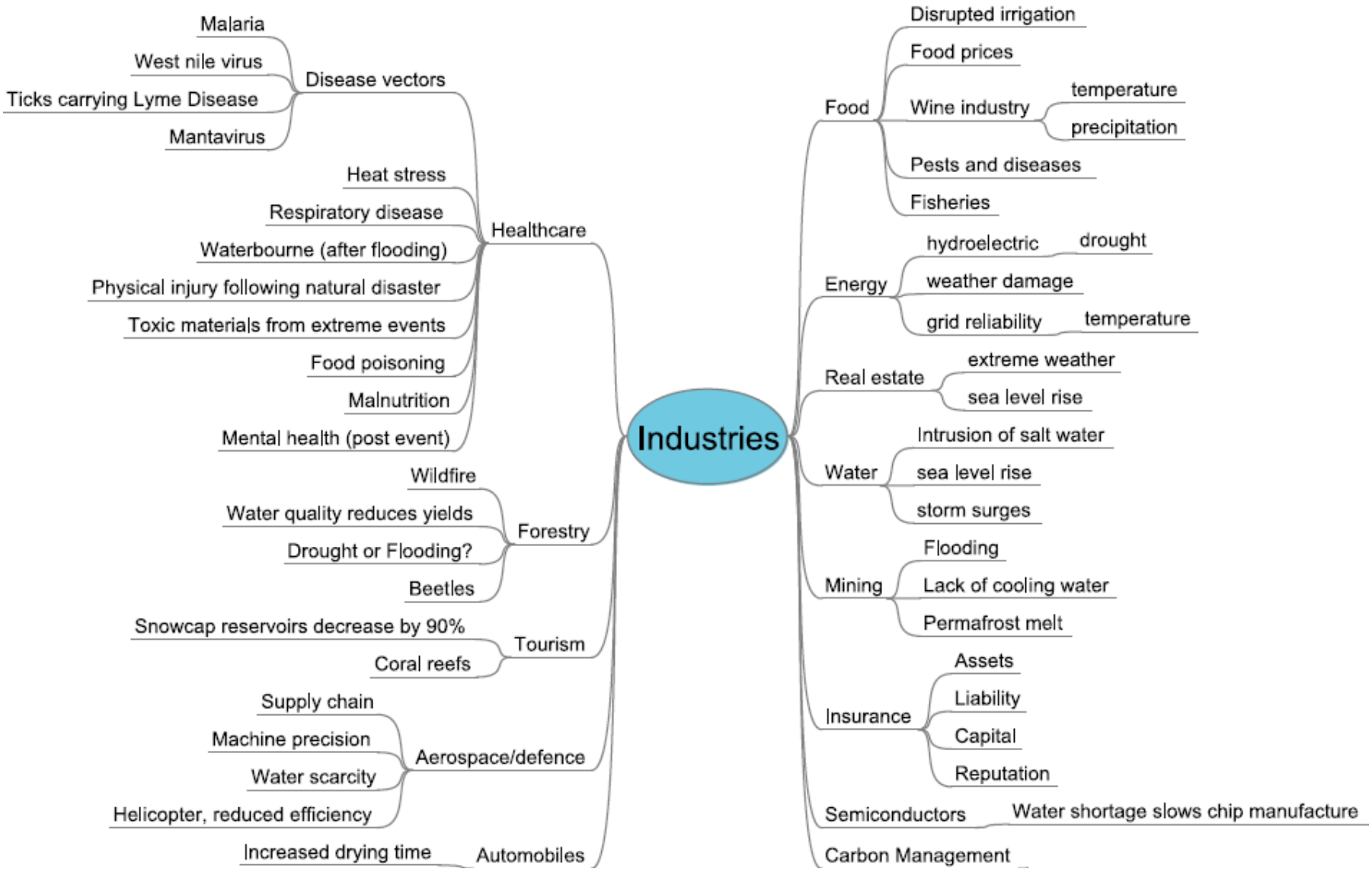


- 46 countries, 2.7bn people high risk of violent conflict
- 56 countries, 1.2 bn people, political instability

CLIMATE CHANGE

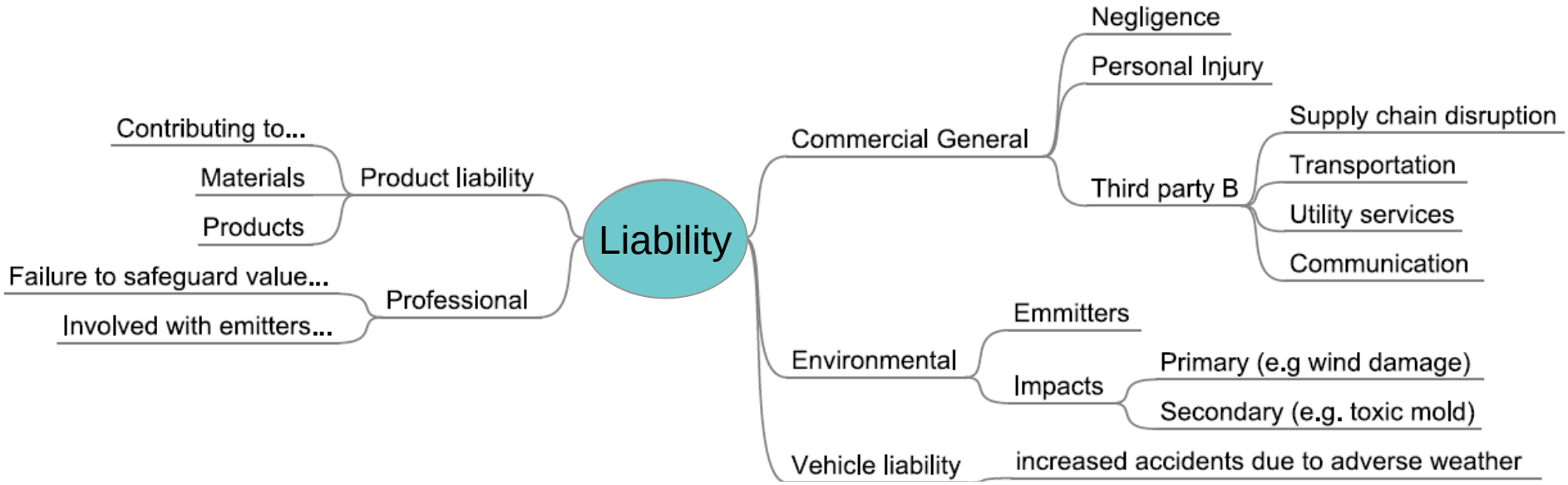
LIABILITY

Lots of affected industries….



Source: Limiting liability in the greenhouse (UCLA: Ross, Mills, Hecht) & Adaptation Tipping Point (Acclimatise, UKCIP)

Plenty of liability policies to target….



Source: Limiting liability in the greenhouse (UCLA: Ross, Mills, Hecht)

Enough is known

- *"Uncertainty over climate change is often cited as justification for delay or inaction. Yet* ***there is greater consensus in the scientific community that man-made climate change is underway than on almost any other issue.***" **The adaptation tipping point (Acclimatise and UKCIP)**

- *"Lawyers are beginning to acknowledge that there is now sufficient information available on climate change for companies to take it into account in both strategic and project level decision-making.* ***All decisions and professional advisors that do not take climate change into account may be open to legal challenge***." **The adaptation tipping point (Acclimatise and UKCIP)**

Growing level of scrutiny/ success…

- *"In late 2006 the SEC took an enforcement action against a major chemical company….it has been speculated that this …may be an indicator of the* ***SEC's growing scrutiny on environmental liability reporting****"* **Limiting liability in the greenhouse (UCLA: Ross, Mills, Hecht)**

- *On the subject of EPA vs Massachusetts "In the US litigation context, the Court's decision is* ***likely to have significant implications*** *for pending and future climate change litigation. Its decision on standing effectively lowers the bar…."* **Freshfields BD May 2007**

- *On the subject of EPA vs Mass "Legal commentary is of the view that this decision will both* ***significantly embolden potential litigants*** *and fundamentally alter US political discourse on climate change… The Court determined that there was now sufficient scientific consensus on the link between anthropogenic CHG emissions and associated harms, the combined effect of which was to create* ***sufficient standing to sue*** *in courts to address climate change"* **Prue Taylor (New Zealand Centre for Environmental Law)**

Ever more disclosure

- *"In the post-Enron environment, where investors are wary of undisclosed risks, there is an* ***ever increasing desire for full disclosure of a company's environmental liability risks****"* **Limiting liability in the greenhouse (UCLA: Ross, Mills, Hecht)**
- *"****Sarbanes Oxley Act of 2002….may render CEOs and CFOs ultimately liable*** *for the accuracy of disclosure of environmental-related liabilities…"* **Limiting liability in the greenhouse (UCLA: Ross, Mills, Hecht)**
- *"The yearly directors' report must contain a business review, and in the case of a quoted company the review* ***must include the main trends and factors*** *likely to affect future development";* **Martineau Johnson (2007)**
- *Proff Liab: "****Central to D&O liability litigation will be disclosure of, or the failure to disclose, material information****"* **Limiting liability in the greenhouse (UCLA: Ross, Mills, Hecht)**

Negligence

- *"A clear example is the tension between increased risk from flooding and the pressing demand for more housing…..**developers run the risk of costly negligence claims if it can be shown they ought to have anticipated and protected against flood risks**. The "reasonable foreseeability" that needs to be proven in establishing negligence becomes easier to assert as the links between climate change and increased incidence and severity of flooding are more regularly drawn"* **Martineau Johnson (2007)**

- *Proff Liab: "One Trigger…would be **breach of the duty of care where [an officer] has not considered climate change in making decisions**"* **Limiting liability in the greenhouse (UCLA: Ross, Mills, Hecht)**

Negligence

- *Proff Liab: "A* ***pension fund fiduciary that failed to consider how global investments would be impacted…would*** *be vulnerable"* **Limiting liability in the greenhouse (UCLA: Ross, Mills, Hecht)**
- *Proff Liab: "Another trigger ..would be…* ***[where] shareholders have filed resolutions …to address climate change risk, and minimal…improvements were made*** *as the business lost value"* **Limiting liability in the greenhouse (UCLA: Ross, Mills, Hecht)**
- *Proff Liab: "…****misrepresentation of climate change impacts or risks could trigger D&O liability****, as a breach of director's duty of good faith"* **Limiting liability in the greenhouse (UCLA: Ross, Mills, Hecht)**

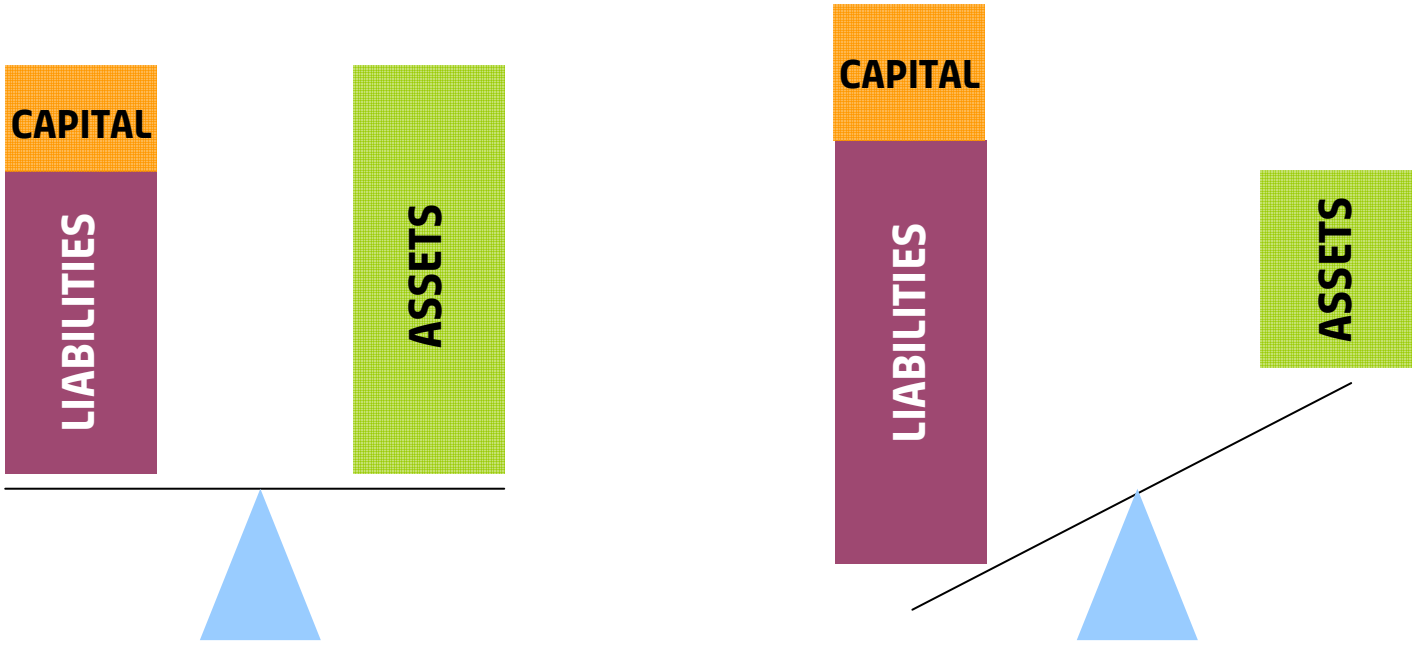
Costs include future harm

- *“Motivations for litigation included compensation for* ***present or future anticipated harm****….”* **Prue Taylor (New Zealand Centre for Environmental Law)**

Legal costs regardless

- *"From insurers' vantage point,* ***liability exposures will of course include legal defence costs, irrespective of whether defendants are ultimately held liable for damages****…."* **Limiting liability in the greenhouse (UCLA: Ross, Mills, Hecht)**

Assets/ liabilities/ capital – quadruple whammy



ClimateWise

- Lead in risk analysis
- Inform public policy making
- Support climate awareness amongst our customers
- Incorporate climate change into our investment strategies
- Reduce the environmental impact of our business
- Report and be transparent

Signatory Companies

ABI
ACE
AIG
Allianz
Amlin
Ark
Aviva
AXA
Beazley
Benfield
BIBA
Catlin
Chaucer
CIS
Diagonal
Equity
F&C
Friends Provident
Hardy
Heritage
HBOS
Hiscox
Kiln
Legal and General
Lloyd's
Lloyds TSB
Marketform
Munich Re
Navigators
NFU Mutual
Prudential
QBE European Operations
RBS
RMS
RSA
Spectrum
Standard Life
Swiss Re
UNUM
XL
Zurich

= Lloyd's market

NANOTECHNOLOGY

WHAT IS IT AND WHY SHOULD WE WORRY?

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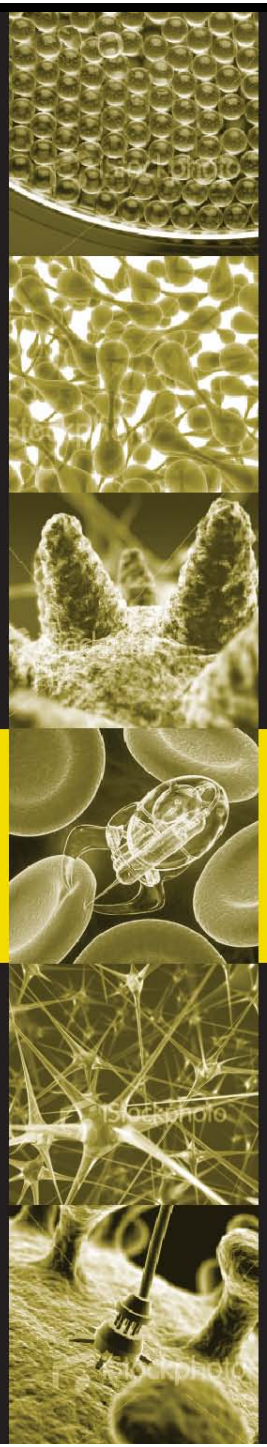


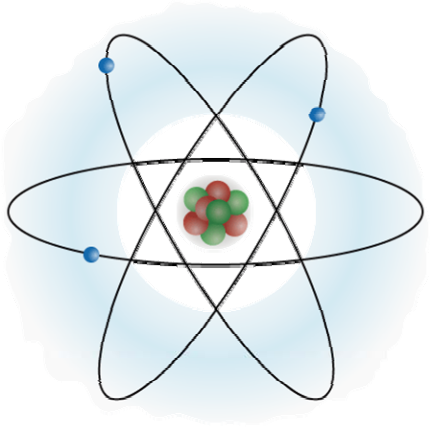
RISKS

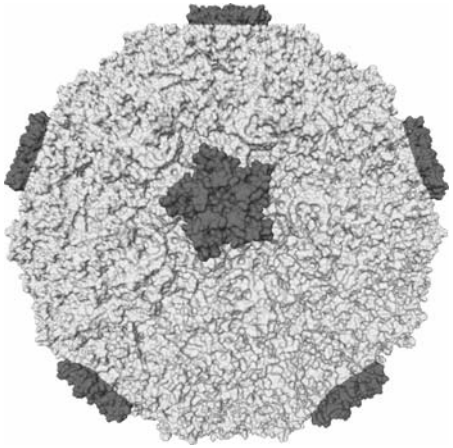
LLOYD'S EMERGING RISKS TEAM REPORT

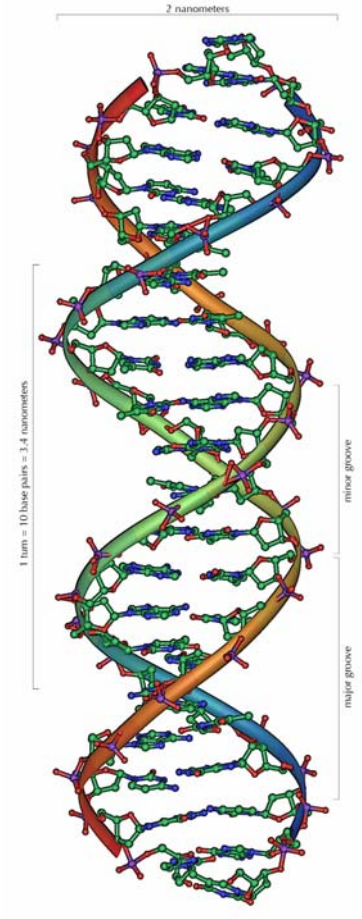
NANOTECHNOLOGY
RECENT DEVELOPMENTS, RISKS AND OPPORTUNITIES

The nanometre world: Examples

- Red blood cell: 7000 nm across
- Common cold virus: 25 nm
- Width of DNA: 2 nm
- Atom of silicon: 0.2 nm
- Nanoparticles: 1-100 nm

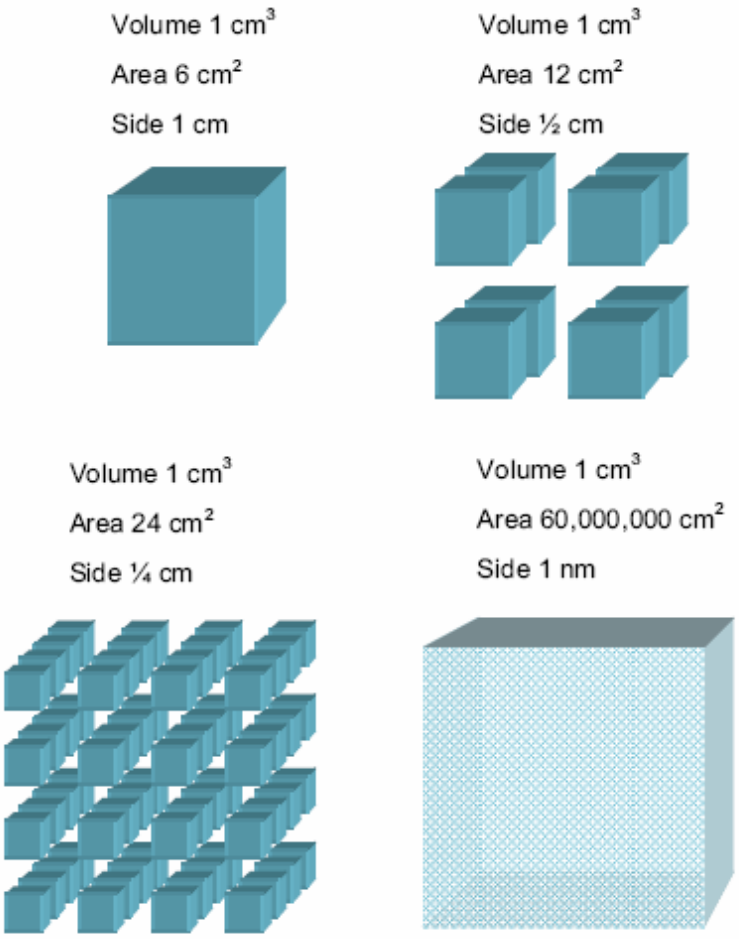






Why should nano be any riskier?

- Surface area – more reactive
- Interact differently biologically
  - Micro, larger than cells
  - Nano, smaller than cells
- Can be confused with “normal” materials



Commercial markets

- Approaching 700 products* on the market
  - Clothes/sports/cosmetics/food
- US$12bn investment in 2006
- Market rapidly growing
- 15% of all products by 2014
- Any nano-specific risks may already be covered by insurance

*Source: Woodrow Wilson Project on Emerging Nanotechnologies

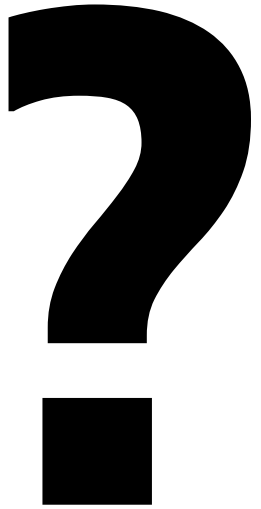
Current uses in consumer products

Enabling technology adds new properties to existing products

Product	Claimed property
Cosmetics	“Antioxidants”, delivery
Clothing	Water proof, stain resistant & anti-odour
Food containers	Anti-microbial
White goods (fridges, washing machines)	Anti-microbial
Sports goods	Enhanced physical properties (stronger, more flexible)
Medical	Anti-microbial

What are the hazards

- We don’t know…
- Type with most potential to cause harm: Nanoparticles
- Limited studies demonstrated:
  - Accumulation in organs
  - Reproduction issues
  - Asbestos like effect of CNT’s
  - Toxicity to aquatic life
- Effect on micro-organisms and plant life
- Many types may be safe, it is simply unknown



- “virtually no data on the potential negative impacts of nanomaterials on the environment” – Royal Society
- “there are few detailed studies on the effects of nanoscale materials in the body or the environment” - EPA

Regulation

- No specific regulation as yet
- Uses existing mechanisms (e.g. REACH in the EU)
  - May be insufficient – mass thresholds
- Environmental Liability - Directive 2004/35/EC: reinforces the “polluter pays” principle - making operators financially liable for threats of or actual damage.
- Importance to insurers - With a regulated and well defined product, exclusions can be written with increased contract certainty

Environment Agency Advice

- Enviroment Agency interim advice on the handling of carbon nano-tubes.
- Audience: "*those involved in synthesis or use of carbon nanotubes or in the management of the wastes produced*"
- Clarifies their duties regarding waste
  - Classify
  - Correctly manage
- "*nanotubes may display hazardous properties either as irritant … toxic … or carcinogenic ….may display physiological properties similar in nature to asbestos*". **Precautionary principle =>hazardous waste.**
- Also: advice on safe disposal/ waste disposal options, >850 deg C preferred

Risk frameworks and codes of conduct

- Nano Risk Framework
  - Describes how to manage nanotechnology risks in detail
  - Recommend every company has a team of experts
- Responsible Nano Code
  - Board level principles to guide companies

- BSI - British Standards
  - Terminology for consistent use
  - Good practice guide for specifying nanomaterials

Managing the risk….

- As a minimum…
  - Find out whether products or processes you insure include significant exposure to nano technologies
  - Track this exposure – it may grow!
  - Ask whether the company follows a formal risk management framework (prev slide)
  - Keep pace with research

PANDEMIC

WIDER IMPACTS AND LIABILITY IMPLICATIONS

Facts and stats

- "*pandemic is inevitable; start planning now*" (Police Commissioner Mike Brown)
- regular series of pandemics in history
- since the 1600s, return period of 30-50 years.
- The last pandemic was in 1968
- vary in their impact (10^5 -> 10^8 deaths)
- some pandemics have affected the young and old; others have targeted those of working age.
- 1918: 20-100m, many deaths bacteria related

Facts and Stats

- **Nature's mixing bowl**
  - **1918 Pandemic** "Spanish flu" H1N1
  - **1957-58 Pandemic**"Asian flu" H2N2
  - **1968-69 Pandemic** "Hong Kong flu" H3N2
  - **1977 new strain in humans** "Russian flu" H1N1
  - **1997 new strain in humans** H5N1
  - **1999 new strain in humans** H9N2
  - **2002 new strain in humans** H7N2
  - **2003 new strain in humans** H7N7, H7N2, H9N2
  - **2004 new strain in humans** H7N3, H10N7

Economic Impact

- 1918 again => major global recession
  - 1% to 10% of GDP lost
  - impact will vary depending on country and within countries.
- Most industries will be affected, typically adversely.
  - face to face interaction => most affected.
  - travel companies, airlines, restaurants/bars, hotels and the entertainment industry.
- SARS outbreak (“only” 774 deaths)
  - 66% reduction in travel arrivals to Hong Kong
  - Cinemas 50% reduction in takings
  - Asia Pacific Region lost some USD 40billion

Economic Impact

- Global recession is likely to impact the investments we hold.
- Liquidity may be affected which can affect short term claim paying ability.
  - More than one thing can happen; hurricane?
- Past pandemics => global trade was significantly different than now.
  - supply chains?
  - “just in time” model =>shortages/ backlogs (waste)
  - Hospitals rarely stockpile drugs or supplies.

1918 = “worst case” ?

- “worst case” scenarios often based on 1918 – adequate?
- 1918 *was* extreme!
  - Spread by troop movements
  - Killed more people than World War 1
  - A prelude of how global trade can accelerate the rate of infection.
  - Case mortality was around 2.5% (black death [25]%)
  - Many deaths caused by bacteria, not the virus
- Current H5N1 virus has over a 50% case mortality rate.
  - reason to hope that human transmissible H5N1 will be weaker, but what if it isn’t….
- H5N1 resistant to some antivirals; what if after it mutates it is also resistant to Tamiflu?
- Models based on just a few data points

Give key employees Antivirals…

- Long term use may have unwanted side effects and is not recommended.
- They reduce the length of illness by around 10% and this is not their main purpose.
- Substantially reduce the risk of death
- Reduce the speed of spread of disease; buying time for vaccines to be developed.

Develop a vacine?

- until a virus has emerged there are so many unknowns we cannot prepare a vaccine.
- takes several months to isolate the virus and prepare a vaccine
- will therefore not be available to fight the first wave of pandemic.

IT issues

- BT Network can cope with spikes
- Lots of potential congestion places though
- Can your ISP?
  - We’re told not all ISPs are equal!
  - BCP plans should ask who key employees ISPs are
- BT/ ISPs not under any legal obligation to provide service except to category 1 responders (police etc)

Could be worse…
….could be better

+ Some pandemics are weaker than others

+ Better medicines (vaccine, antiviral, fever reduction, antibiotics)

+ WHO's coordination

+ Better general health

- Globalisation (see "Economy" section later)

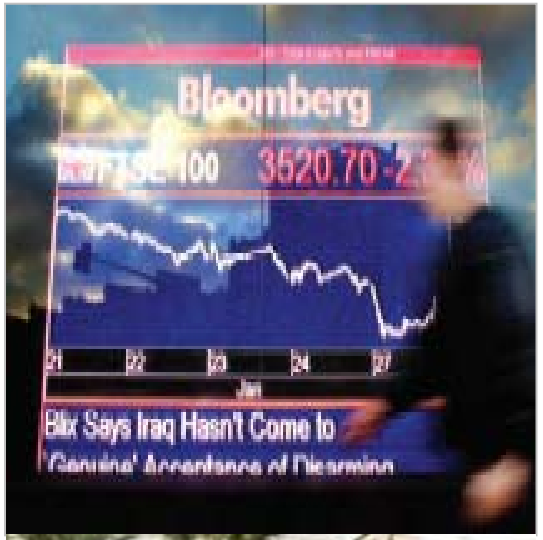
- Cytonkine storms affect the most healthy

- Larger population, more living in cities

Scenario

Have this in the back of your mind…

- Global recession
  - businesses struggling
- Society will not be operating as it ordinarily does.
  - High absenteeism (50%)
  - Media hype
  - Illness and deaths of relatives and colleagues
  - food may be short in some areas
  - breakdown of law and order in some areas
  - police/ fire services/ ambulance services stretched
- Increase in fraudulent claims….
  …. creative interpretation of policy wording.



Insurance Impact

- **Business impacts generally**
- Life/health
- Credit Insurance
- **General Liability**
- **D&O**
- **Employers Liability**
- Medical Malpractice
- **Marine Liability**
- Marine/ Aviation Hull
- Property, business interruption
- **Hotel/ hospitality Business Interruption**
- **Event cancellation cover**
- Travel Insurance
- Terrorism/ political risk
- Property damage (fire, escape of water)
- Property damage (other claims)
- Theft
- **Motor**

What can we do?

- **Liability**
  - Ask if the insured has a *pandemic* plan (not just BCP as the risks are different)
  - Is it regularly tested?
  - What is the budget for BCP team; track this
- **Check policy terms for sideways risk**
- **Do YOU have a plan?**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