*Introducing Catastrophe Risk man-made hazards**

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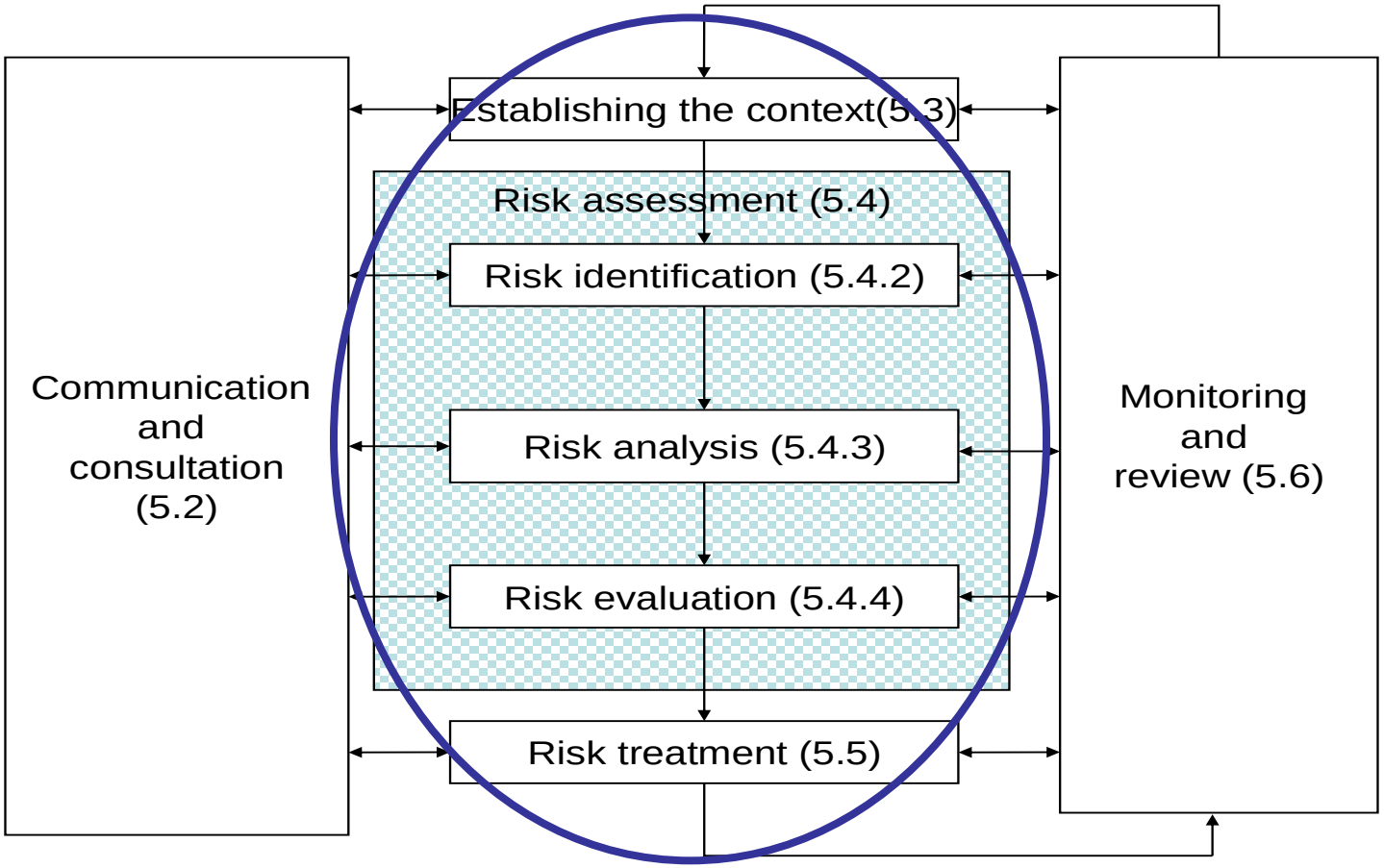
* This presentation expresses the views of the author and neither the views of EIOPA nor the IRSG.

agenda

- Risk management process
- Assessment of man-made hazards:
  - Identification
  - Analysis &
  - Evaluation of existing risks
- Treatment of man-made hazards
  - Prevention & protection of risks
  - Crisis management & business continuity planning
  - Risk transfer: insurances & loss adjusting
- Annexes
- References

Risk management process



Source: ISO 31000

Man-made & technological types of disasters

Man-made disasters are loss events associated with human activities:

1. *Accidental risks*:
   - ✓ Major fires, explosions
   - ✓ Aviation, maritime, rail disasters
   - ✓ Mining accidents
2. *Environmental risks*:
   - ✓ Hazardous materials:
     - chemical spills & groundwater contamination
     - Chemical threat & biological weapons
   - ✓ Power service disruption & blackout
   - ✓ Nuclear power plant & nuclear blast: can be in combination, natural & man-made catastrophe, cfr Fukushima
   - ✓ Radiological emergencies
3. *Geopolitical risks*: civil unrest and terrorist attacks
4. *Technological risks*: cyber attacks

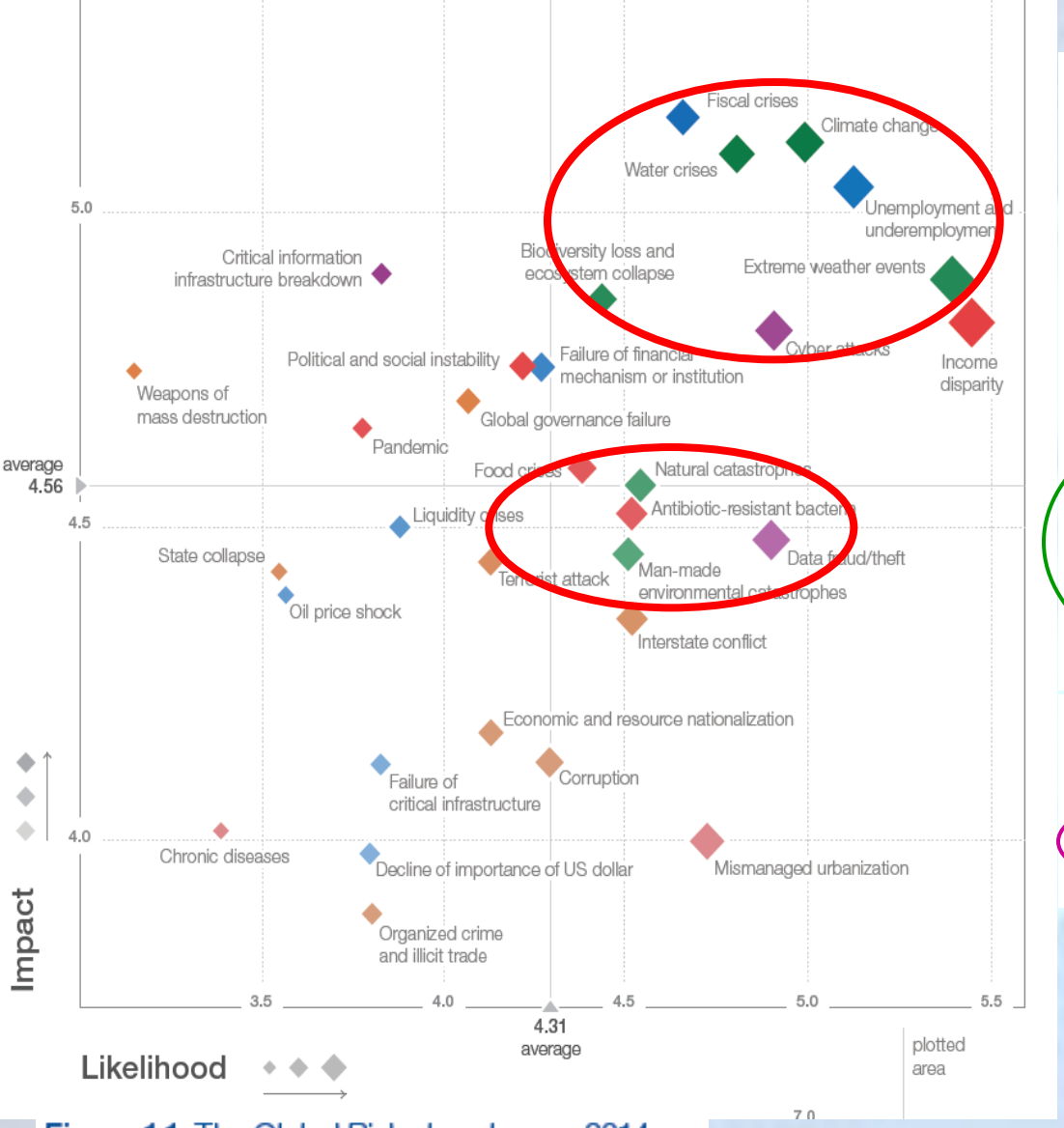


Figure 1.1: The Global Risks Landscape 2014

Economic Risks
- Fiscal crises
- Failure of financial mechanism or institution
- Liquidity crises
- Unemployment and underemployment
- Oil price shock
- Failure of critical infrastructure
- Decline of importance of US dollar

Geopolitical Risks
- Global governance failure
- State collapse
- Corruption
- Organized crime and illicit trade
- Terrorist attack
- Weapons of mass destruction
- Interstate conflict
- Economic and resource nationalization

Environmental Risks
- Extreme weather events
- Natural catastrophes
- Man-made environmental catastrophes
- Biodiversity loss and ecosystem collapse
- Water crises
- Climate change

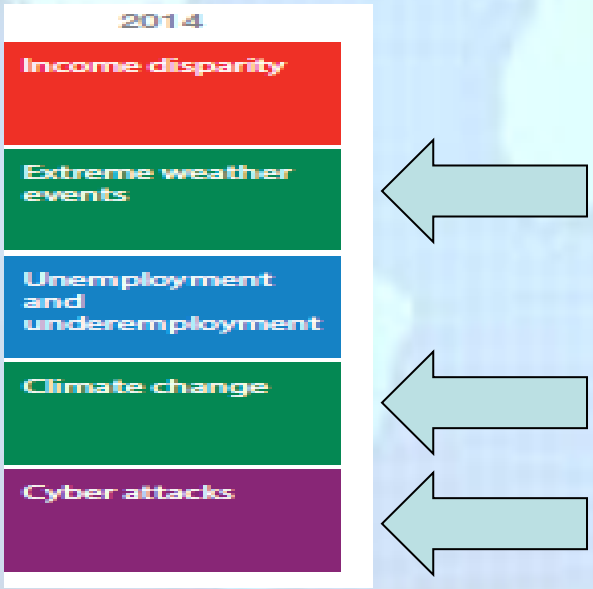
Societal Risks
- Food crises
- Pandemic
- Chronic diseases
- Income disparity
- Antibiotic-resistant bacteria
- Mismanaged urbanization
- Political and social instability

Technological Risks
- Critical information infrastructure breakdown
- Cyber attacks
- Data fraud/theft

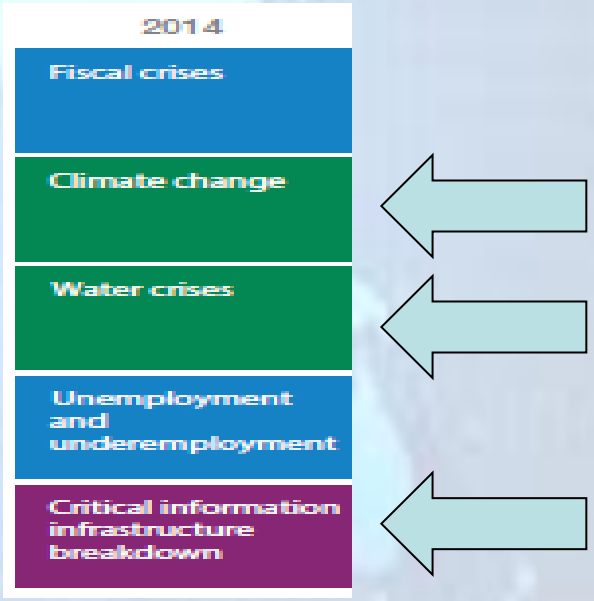
Source: Global Risks Perception Survey 2013-2014 – World Economic Forum (WEF)

Top 5 Global Risks 2014 in terms of …

likelihood

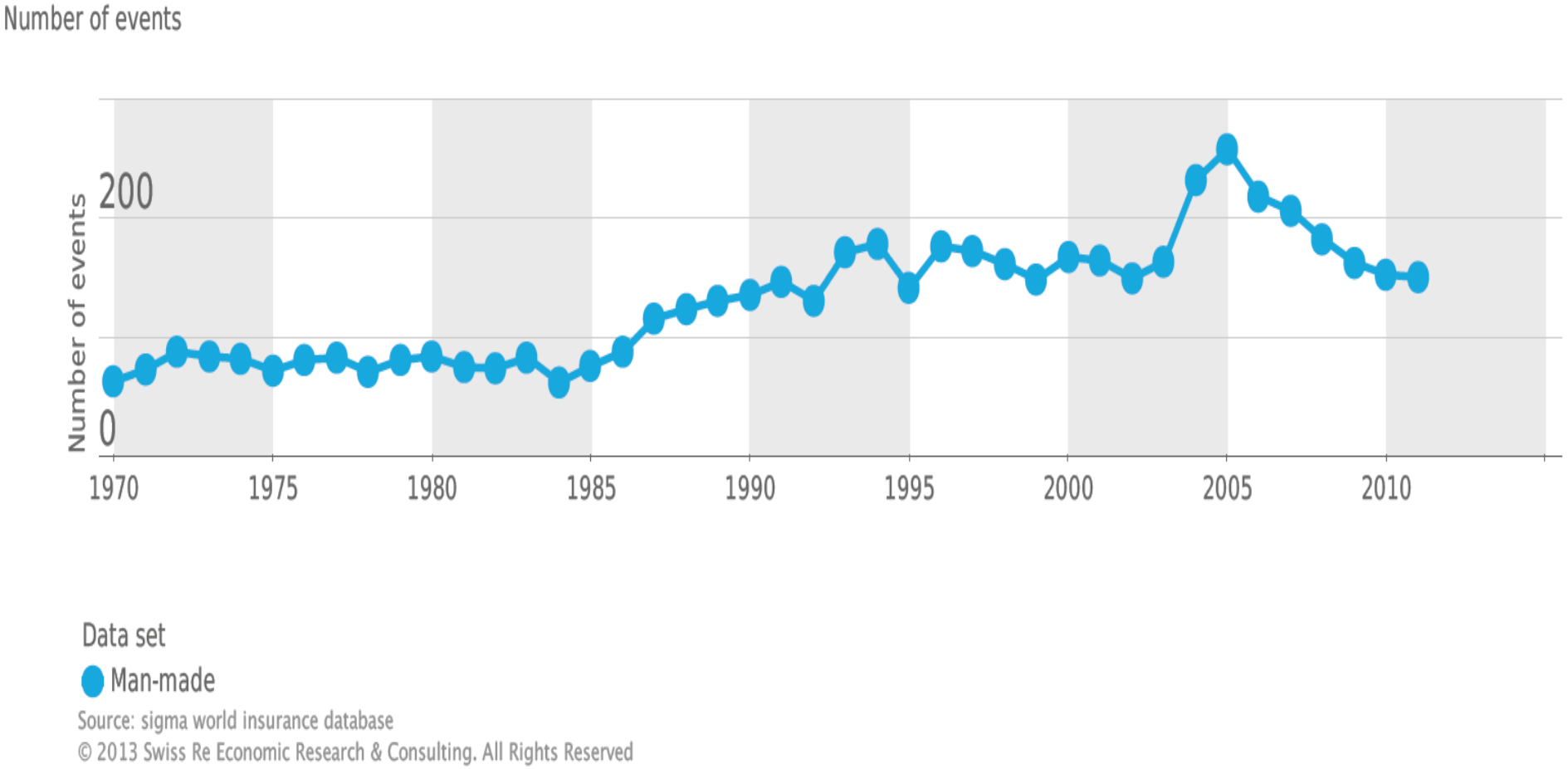


impact

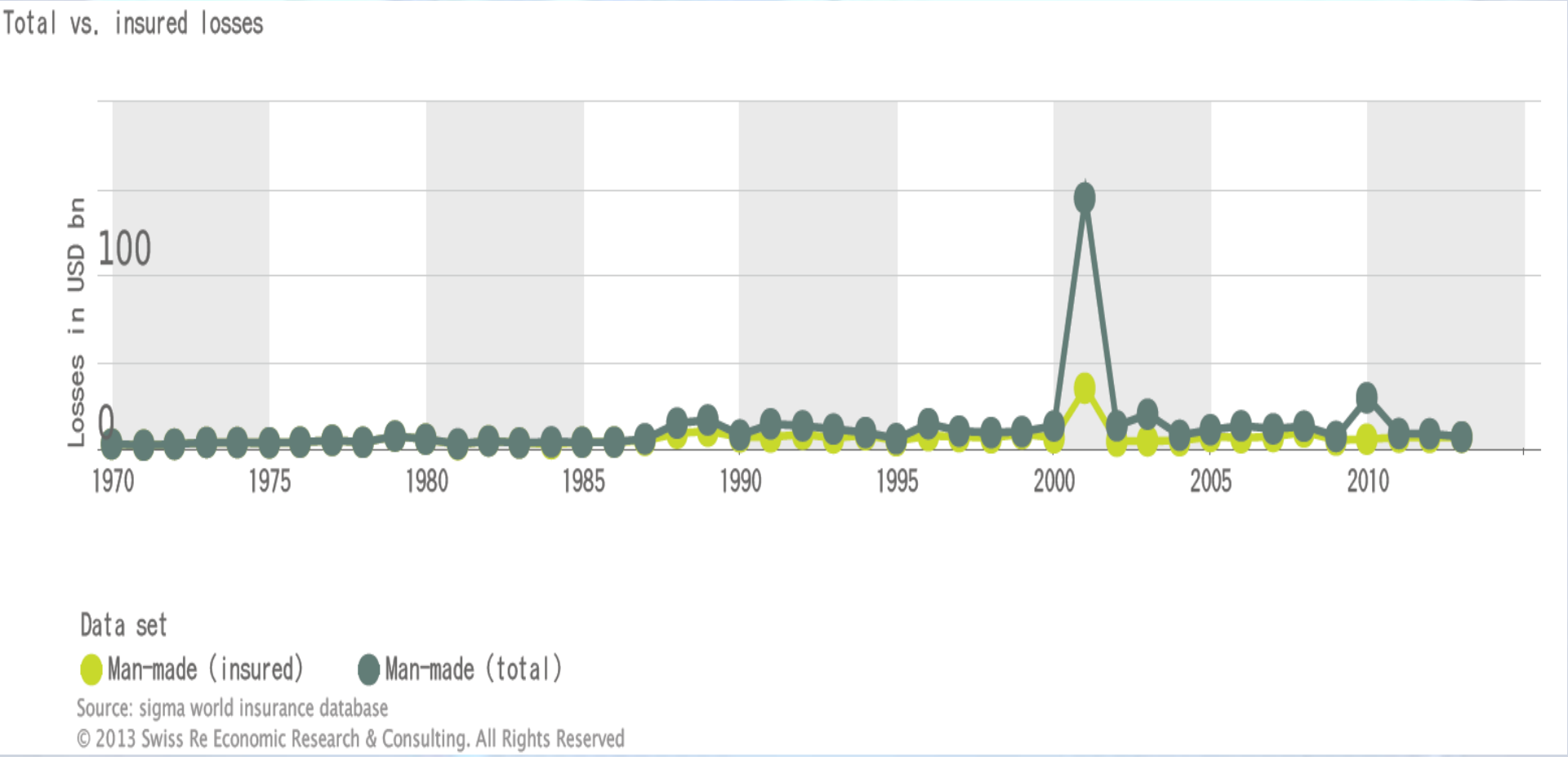


Source: World Economic Forum (WEF)

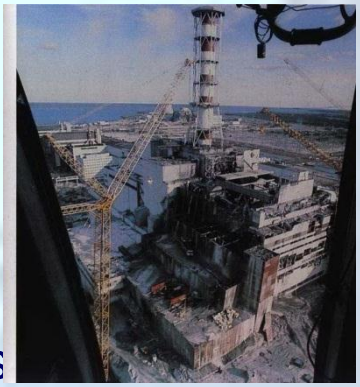
History of number of man-made events since 1970



History of total versus insured man-made losses since 1970



Top 5 most expensive man-made disasters throughout recent history (1)



1. 1986: Chernobyl Reactor nr 4: 235 bio USD damage – XX lives: rating disaster is 7 out of 7 on the nuclear disaster scale (only 1 of the 2 nuclear disasters rated as such: the other one is the Fukushima plant explosion in 2011)

2. 2010: the Deepwater Horizon Oil Spill: 42 bio USD repair and clean up costs - 11 live – 150 people ill: costliest petroleum spill in human history

3. 2003: Columbia Space Shuttle Disaster: 13 bio USD damage – all crew members: cause engineering failure

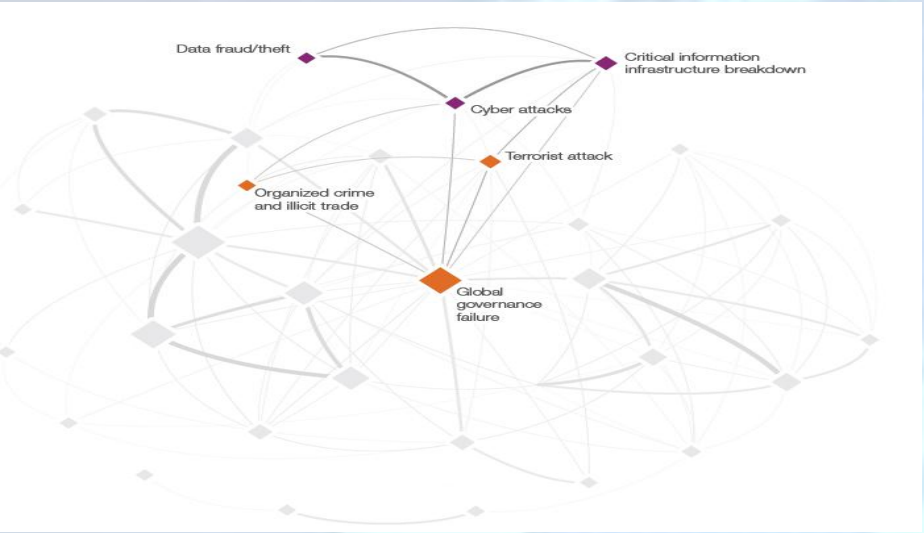
Top 5 most expensive man-made disasters throughout recent history (2)

4. 2002: the Prestige Oil spill: 12 bio USD of damage – loss of many lives – destroyed the northern coast of Spain: combined negligence

5. 1986: the Challenger Explosion: 5.5 bio USD of damage – 7 astronauts killed: origin of accident: freezing conditions, faulty equipment, poor organisation

Top 5 most expensive terrorist attacks in recent history

1. *World Trade Center Attacks, September 11, 2001: $3 trillion (full cost)*
2. *Bishopsgate Bombing, London, April 24, 1993: over $1.2 billion*
3. *Manchester Bombings, June 15, 1996: $966 million*
4. *Baltic Exchange Building Bombings, London, April 10, 1992: over $2.2 billion*
5. *London Bombings, July 7, 2005: over $1.2 billion*



Cyber risk evaluation & evolution (1)

Cfr Global Risks 2014 WEF

- *Digital disintegration:*
  - Cyberspace proved to be largely resilient to attacks
  - Reasons to believe resilience is gradually undermined and this dynamic of vulnerability to become more impactful, due to
    - Growth of activity on internet
    - Ever-deepening complexity of interactions
    - Need for global governance of the internet

Cyber risk evaluation & evolution (2)

- Offence vs. Defence in Cyberspace:
  - As the internet was built for resilience rather than security
  - Cyber risks will continue to get more serious
- Interconnectedness, complexity & systemic risks:
  - Environmental triggers can play a role, given the inherent fragility of the underlying physical infrastructure
  - Risks from hyperconnectivity require urgently multistakeholder collaboration
  - But trust is under pressure, cfr the role of th National Security Organizations
- The Worst-Case scenario: *"Cybergeddon":*

  "insecure growth" a world in which users are scared away from intensive reliance on the internet.

Prevention & protection of risks (1)

- ***Identification & Measurement of risks:***
  - Important to have and have access to statistical data on catastrophe information processed by public entities: for insurers and risk managers
  - Measurement of cyber risks:
    - Develop methodologies to measure and price these risks
    - Capture effects on the 'enterprise network': connected supply chains, outsourcing,.. and 'intangibles and goodwill' , …
    - Effect on reputation and stock-price of organisations

- ***Implement risk evaluation and risk control measures:***
  - As well technical defenses, good safety and security requirements,
  - As improving processes, procedures and guidelines, e.g. cyber risk security management: cfr Belgian cyber security guide, (see annex 3)
  - Training the management how to handle crises (crisis management and business continuity planning) (see annex 4)

Prevention & protection of risks (2)

Messages from WEF (World Economic Forum) 2014:

- To ***manage catastrophic risks*** a cultural shift to ***public-private partnerships*** may be positive:
  - Public sector can offer: disaster management frameworks, incl. legal protections, personnel and training
  - Private sector can offer products and supplies, innovative processes, community understanding & engagement, customer collaboration-driven engagement, & intimate knowledge of how critical infrastructure and communities work at local level;
  - Research & development can be offered by both sectors
  - Their interests are:
    - Shared: safety & security of people and property and continuity of business
    - Private sector also interested in establishing competitive advantages
- Change to a culture of ***long-term thinking***
- ***Learn from responses*** to large-scale disasters

Insurance & loss adjusting

- ***Insurance:***
  - to be able to finance the damages, business interruptions & third party liabilities;
  - Where possible commercial insurance (+captives);
  - Important to have premiums adapted to quality of risk management & based on audit of assets;
  - *If needed pooling system* can help: e.g. exists already for NatCat & terrorism coverage in several countries (difficult insurance area); per country system, no EU wide system
  - Certainly ***no compulsory disaster insurance*** needed as
    - there is a moral hazard because it does not encourage organisations to develop and implement risk control measures
    - pending questions: who decides on ‘major disaster’, what governance?

Insurance & loss adjusting (2)

- Some insurance areas are in evolution:
  - Cyber risk insurance
  - Terrorism insurance and reinsurance is more difficult, but a lot of countries have established a national pooling system, different per country
- ***Claims management & Loss adjusting***:

  Important to work together: loss adjusters, insurers, brokers and risk managers

annexes

Table 6
List of major losses in 2012 according to loss category

annex 1: overview losses 2012

	Number	in %	Victims[25]	in %	Insured loss[26] (in USD m)	in %
Natural catastrophes	**168**	**52.8%**	**8948**	**64.2%**	**71278**	**92.3%**
Floods	63		2979		2712	
Storms	61		3129		54065	
Earthquakes	15		717		1787	
Droughts, bush fires, heat waves	8		139		11524	
Cold, frost	13		1806		250	
Hail	5				900	
Other natural catastrophes	3		178			
Man-made disasters	**150**	**47.2%**	**4981**	**35.8%**	**5960**	**7.7%**
Major fires, explosions	**40**	**12.7%**	**1367**	**9.8%**	**2933**	**3.8%**
Industry, warehouses	19		497		1137	
Oil, gas	12		94		1696	
Department stores						
Other buildings	5		454			
Other fires, explosions	4		322		100	
Aviation disasters	**11**	**3.5%**	**449**	**3.2%**	**557**	**0.7%**
Crashes	8		449		142	
Explosions, fires						
Damage on ground						
Space	3				415	
Maritime disasters	**43**	**13.5%**	**1701**	**12.2%**	**2208**	**2.9%**
Freighters	4		14		224	
Passenger ships	26		1679		719	
Tankers	3		6		130	
Drilling platforms	6		2		929	
Other maritime accidents	4				206	
Rail disasters (incl. cableways)	**5**	**1.6%**	**141**	**1.0%**		**0.0%**
Mining accidents	**2**	**0.6%**	**66**	**0.5%**		**0.0%**
Collapse of buildings/bridges						
Miscellaneous	**49**	**15.4%**	**1257**	**9.0%**	**262**	**0.3%**
Social unrest	15		152		116	
Terrorism	25		785			
Other miscellaneous losses	9		320		147	
Total	**318**	**100.0%**	**13929**	**100.0%**	**77238**	**100.0%**

Source: Swiss Re Economic Research & Consulting

annex 2: Statistics catastrophes 2009-2012

	nr catastrophic events	total cost mUSD	people died
2012	318	168 bio USD economic	14.000
2011	325	378 bio USD	35.000
2010	304	43,6 bio USD	303.573
2009	288	62 bio USD	21.000
2008	311		246.100

	man-made	cost man-made	people died
2012	150	6 bio USD insured	4.981
2011	175	8 bio USD	6.000
2010	137	3,6 bio USD	6.446
2009	155		6.000
2008	174		5.600

	natural	cost natural	people died
2012	168	71 bio USD insured	8.948
2011	150	370 bio USD	29.000
2010	167	40 bio USD	297.127
2009	133		15.000
2008	137		240.500

2012	hurricane Sandy
2011	Japan earthquake and tsunami
2010	Haïti earthquake
2008	earthquake Myanmar
source	Sigma reports Swissre

annex 3: Belgian cyber security guide

annex 4: crisis management & business continuity planning

- ***Public crisis management*** important: in order to reduce their risk exposure:
  - Appropriate legislation on urbanism
  - Health and safety legislation and compliance
  - Early warning systems
  - Public staff training,
  - Integration of these efforts with local companies
- ***Business crisis management*** & business continuity planning:

  more focused on their own activities, market share, reputation, property and personnel

references

- *Global risks 2014* – Ninth Edition - World Economic Forum (WEF) – January 2014
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- *Belgian cyber security guide:*
  http://www.iccbelgium.be/index.php/quomodo/becybersecure