

Solar storm

How to calculate insured/reinsured losses ?



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Your knowledge, Q&A, views are requested

Introduction

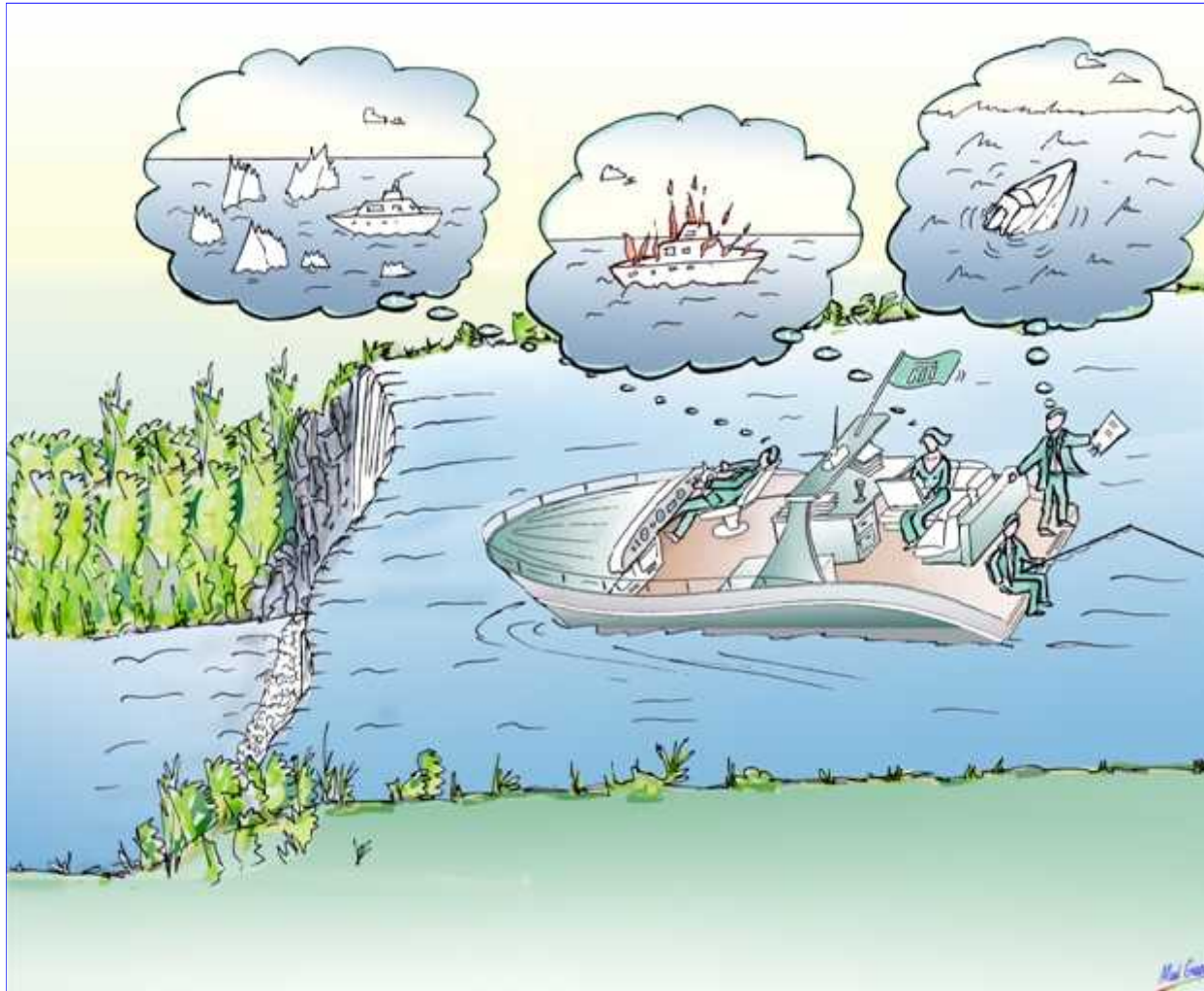
RM mandate

Risk Management enables conscious and transparent risk-taking by proactively partnering and constructively challenging stakeholders in order to facilitate business success across Swiss Re

Key priorities

- Respond to external market challenges and risks
- Deliver Risk Management services more efficiently
- Continue to strengthen Risk Management's talent

Solar storm: a real (?) risk/opportunity (?) and its RM context



Don't miss the obvious

Don't forget the exotics

Top 15 current risks (SF contribution)

Credit spread

TC North Atlantic (e.g.4.4 bn ,1/200y 2014)

Mortality

Equity

EQ California

Lethal pandemic

Costing & reserving

Terrorism

Non-life claims inflation

Generic liability

Credit

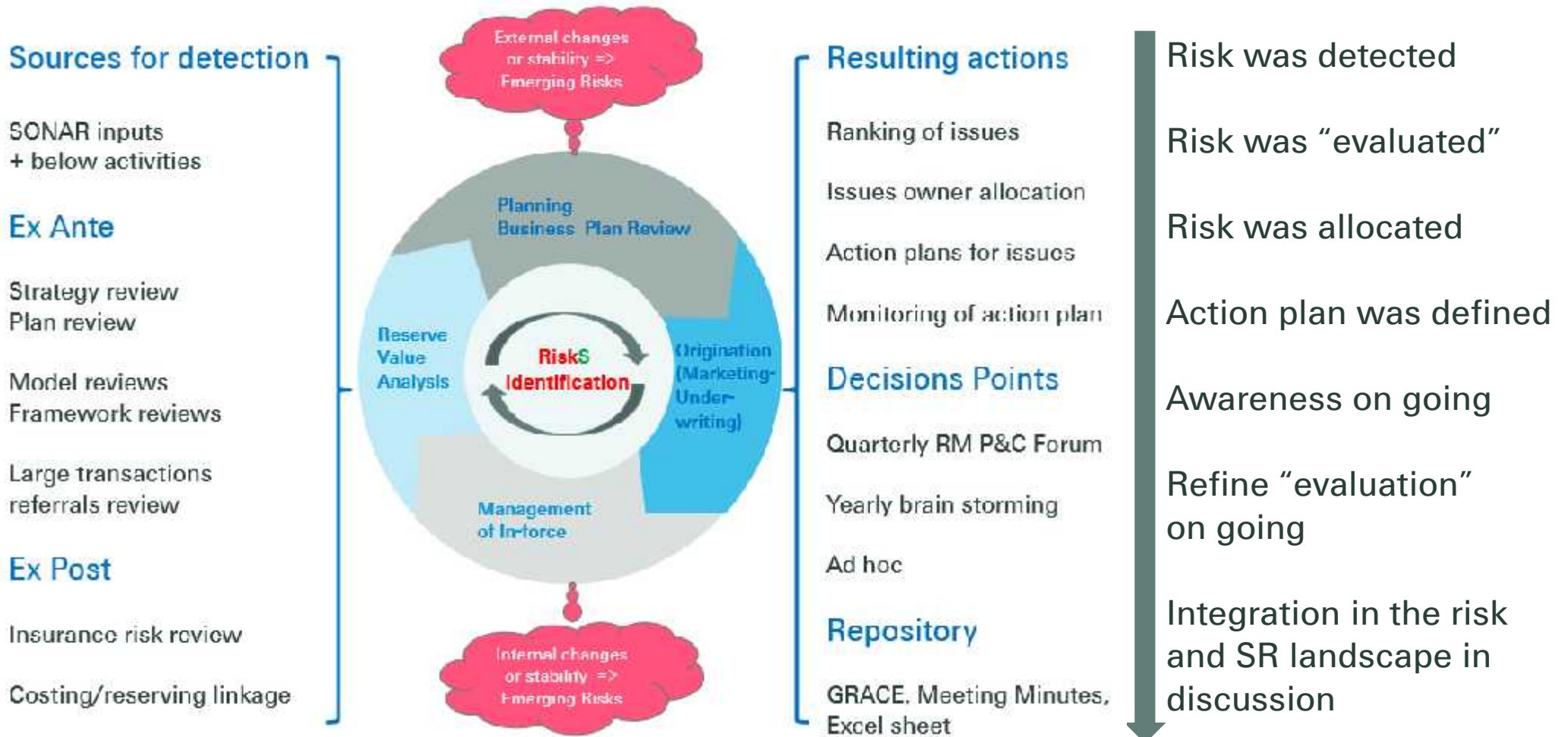
Lapse

EQ New Madrid

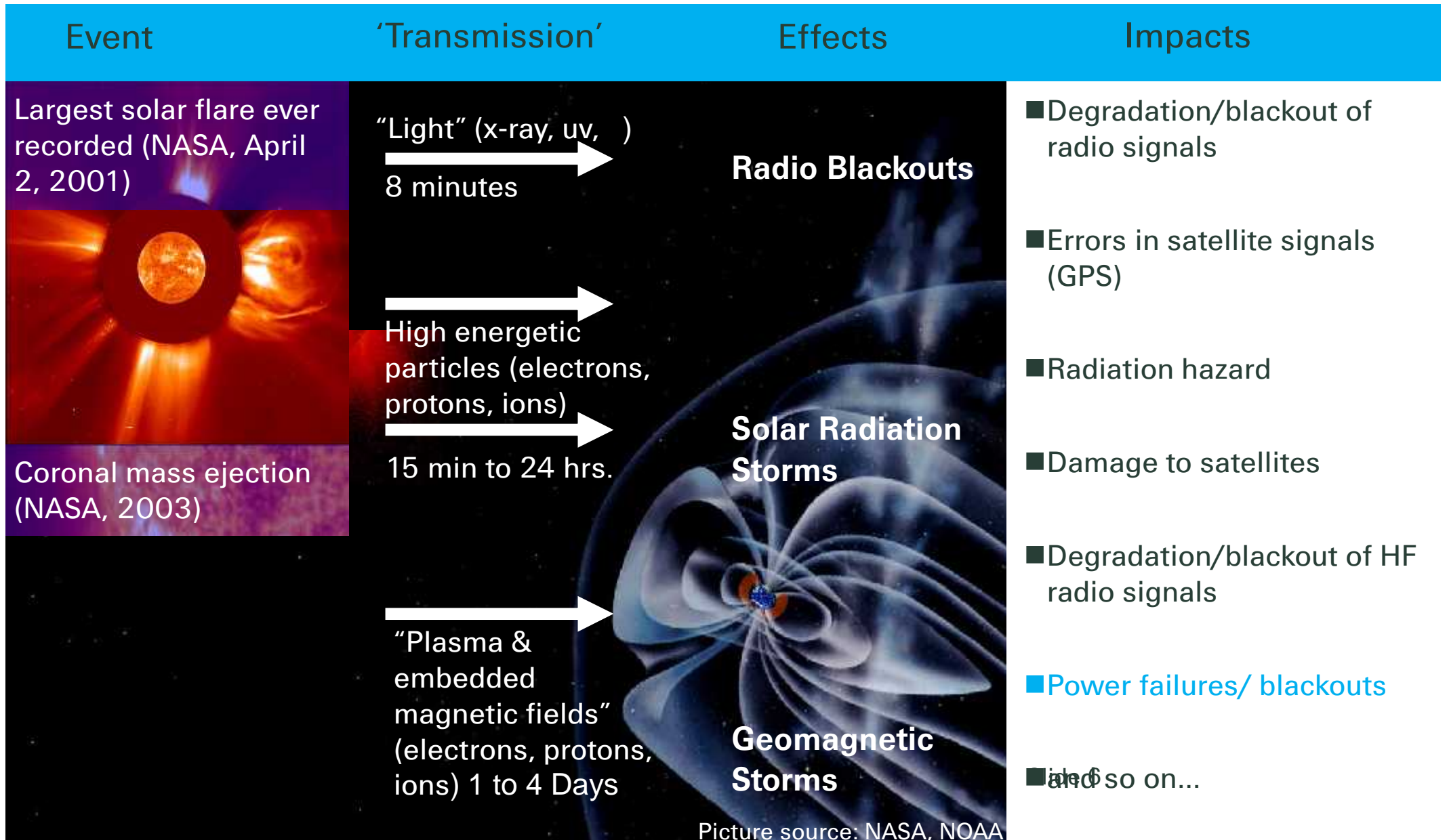
Real estate

D&O & auditors' PI

Solar storm: work already done and RM role



Solar Storm as a risk -1 Phenomenon (F/I ?)



How to calculate insured/reinsured losses ?

Information & Data quality and granularity

The solar storm characteristics: physical phenomenon with large geographical scale, however concentrated on “extreme” Northern/Southern latitude countries, across several Lobs, but during a relatively “short” event period and requiring only “recent” exposure information.

Exposure data (insurance vs reinsurance)

- As a new risk, the underlying data are currently not really granular and fit for purpose. However data can be adapted rapidly and built from other areas (e.g. natcat), while IT capability allows for dealing with granular data (big data)
- The countries most at risk are mature market where the collection of Data has already a high level of sophistication and efficiency (telematics)

Claims data (insurance vs reinsurance)

- No real claims data as use of power grid too recent for 100/200 years event, while use of technology has radically evolved, meaning limitation in calibration accuracy
- Most recent cases have some estimates but more from an economic impact perspective and/or in term of number of affected people, still a starting point

Reporting tools and systems

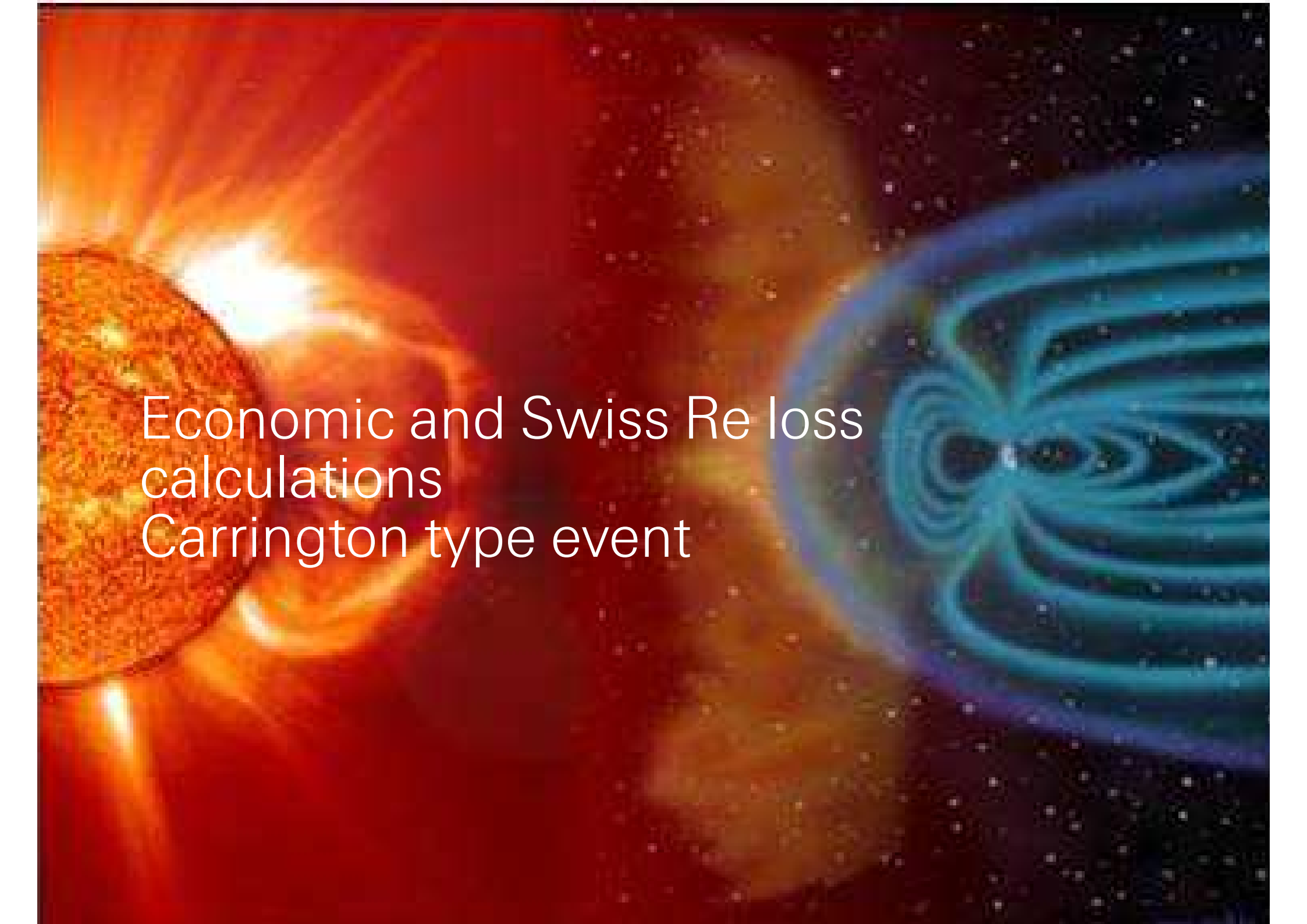
The solar storm characteristics: physical phenomenon with large geographical scale, however concentrated on “extreme” Northern/Southern latitude countries, across several Lobs, but during a relatively “short” event period and requiring only “recent” exposure information.

Structured data (insurance vs reinsurance)

- Insurance companies information, industry information
- Pricing tools (e.g. Concert / ODS-P) vs Administration tools (e.g. IUF / CMPDWH) vs accounting tools (e.g. PER / Sicsnt)
- Structured data should be available, but needs automated clean up mechanism for not plausible data

Unstructured data (insurance vs reinsurance)

- Block finder tool type as potential help for contract certainty and cost evaluation ?



Economic and Swiss Re loss
calculations
Carrington type event

Top down approach (advantages/disadvantages)

Accumulation control perspective

- More robust approach as possible to sense check the overall accumulation amount (total aggregated economic loss => total aggregated limits => total aggregated claims)
- More “stable” and quick approach with a workload/benefit higher in the initial research phase
- Frequency less of an issue as physical phenomenon

Pricing and costing perspective

- Not really meaningful on contract level as not granular enough to take sufficiently accurately in consideration the policy/treaty specificities, being in term of structure, exclusion, scope covered

Prolonged Power Blackout

Swiss Re potential impact

Swiss Re loss scenario 1: up to USD 7bn

- "Carrington"-type solar storm from 1859 applied to today's power infrastructure
- Return period of 150-500 years
- Main lines of business: Property Business Interruption and CBI
- Potential liquidity issues due to relatively fast payouts expected


Potential cross-accumulation with In-orbit Satellite exposure (USD 800m)

Swiss Re loss scenario 2: up to USD 0.5bn

- due to large solar storm (Québec plus-type event) with return period of 11 years
- Main lines of business: Property Business Interruption and CBI

Assumption grid to build scenarios

Impact on GDP

 applied assumptions

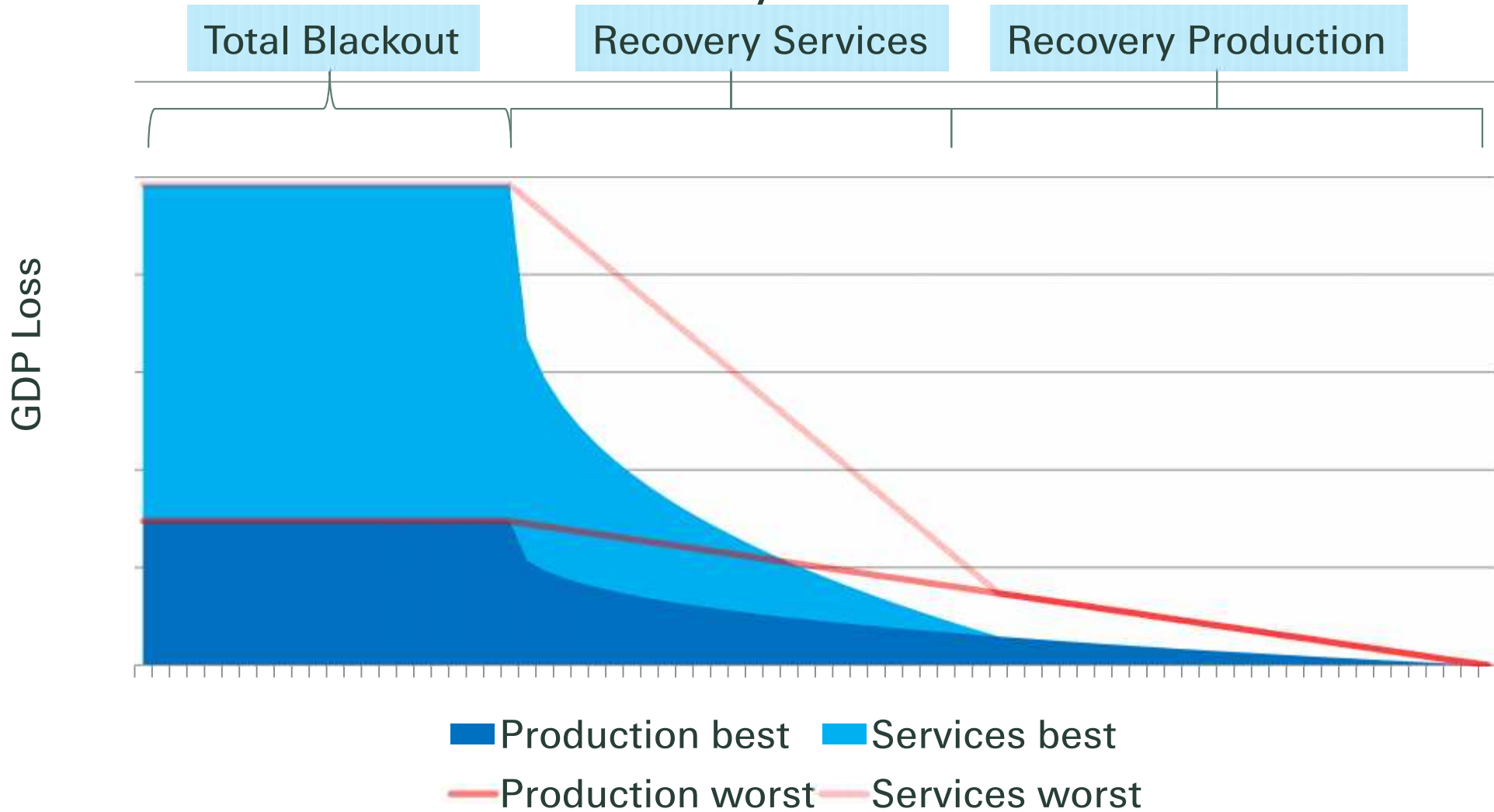
Transformer % affected	GDP affected	Total Blackout days	Recovery days Services	Recovery days Production	Accumulation of regions
1%	1%	<1	<1	<1	No
3%	3%	2	7	7	Local
10%	5%	7	14	14	Europe
20%	10%	14	28	28	US/CDN/Europe
35%	50%	21	56	56	US/CDN/Europe/Japan
50%	100%	112	112	112	Germany
		365	365	365	US/CDN
		730		730	UK

Severe solar storm

Assumptions used for economic loss calculation

- "Carrington"-type event of 1859 hits today's infrastructure
- Geomagnetic Induced Current will damage 10% of transformers in a specific region (e.g. USA/Canada, Scandinavia/UK, or Japan)
- Total blackout: 3 weeks
- Regional impact: 10% of GDP affected
- No accumulation among regions due to area and grid independency, except Europe
- Recovery of GDP
 - Services within 4 weeks
 - Production within 8 weeks
- Split GDP in Services/Production: 70%/30%

Economic loss calculation Total blackout incl. recovery



Severe solar storm

Swiss Re loss calculation

- Basis: Total Economic Loss
- Main Lines of Business: Property including business interruption and CBI
- Vulnerability of Insurance and Reinsurance coverage by country according to Products UW assessment
- Swiss Re market share according to Products UW assessment, respectively assumed where no information available (10%)
- Treaty: Calculation of both, GDP and Portfolio basis (finding: Economic loss is smaller than Swiss Re's treaty capacity provided)
- Time deductible 24 hours
- Fac Reinsurance assumption: + 15% of treaty exposure
- CorSo: Accumulated sum insured (assumption: USD 15m/policy, 25% of agreements)
- Validity checked with former calculations of UW

Severe solar storm ("Carrington"-type event) Economic/Swiss Re loss non-linear / linear recovery estimates

Regions	Economic Loss		Swiss Re Total		Reinsurance		CorSo	
	Non-linear	Linear	Non-linear	Linear	Non-linear	Linear	Non-linear	Linear
US&Canada	128'808	163'866	1'359	1'748	1'196	1'538	163	210
Scandinavia & UK	28'903	37'210	999	1'267	903	1'171	96	96
Germany, France, Italy, Switzerland, Austria	73'934	95'185	4'725	6'015	4'340	5'630	385	385
<i>Accumulation Europe</i>	<i>102'837</i>	<i>132'395</i>	<i>5'723</i>	<i>7'282</i>	<i>5'242</i>	<i>6'801</i>	<i>481</i>	<i>481</i>
Japan	41'746	53'745	857	1'098	754	978	103	119
Australia	7'617	9'806	594	758	550	714	44	44

Figures in mUSD

Validity check with historical events

Event	Cause	Duration	People	Economic loss
Hydro Quebec 1989	Solar storm	9 hours	6m	CAD 10m
USA/CDN 2003	Various	4 days	50m	USD 4bn-8bn
Italy/Swiss 2003	Natural event	1.5 hours up to 2 days	56m	unknown

Estimates of Swiss Federal Office of Energy¹: A blackout may result in an economic loss between CHF 2bn and 4bn per day

¹ electro Suisse
Bulletin 12s/2011

Regional impact – Minor Event

- "Hydro-Quebec + findings from Auckland"-type event
- Geomagnetic Induced Current will damage 3% of transformers in a small region
- Total blackout: 2 days for the region plus 8 weeks for a smaller area (1%)
- Regional impact: 3% (2 days) respectively 1% (4/8 weeks) of GDP affected
- Europe mainly Country impact, but accumulation due to grid connectivity possible
- Recovery of GDP
 - Services within 4 weeks
 - Production within 8 weeks
- Swiss Re impact estimates based on the major event factors

Quebec plus type event

Regions	Economic Loss	Total Swiss Re	Swiss Re R/I	Swiss Re CorSo
US&Canada	8'977	304	267	36
Scandinavia	739	52	45	6
UK	1'203	101	89	12
<i>Total Scan&UK</i>	<i>1'942</i>	<i>153</i>	<i>134</i>	<i>18</i>
Germany	1'843	129	113	15
France	1'466	246	216	30
Italy	1'169	147	129	18
Switzerland	277	9	8	1
Austria	213	15	13	2
<i>Total D/F/I/CH/A</i>	<i>4'968</i>	<i>545</i>	<i>480</i>	<i>65</i>
Japan	2'805	170	149	20
Australia	512	93	82	11

Figures in mUSD

Evolution of loss estimates

Increased knowledge – still high uncertainty

November 2011

Country	Swiss Re
US	12bn
Canada	5bn
Germany	4bn
UK	4.5bn
France	5.5bn
Japan	5.5bn
...	

March 2012

Country	Swiss Re
US	4bn
Canada	1.5bn
Germany	2.5bn
UK	2bn
France	4.5bn
Europe	12.5bn
Japan	3bn
...	

April 2012

Country	Swiss Re
US	1bn
Canada	0.5bn
Germany	2.5bn
UK	1bn
France	2bn
Europe	7bn
Japan	1bn
...	

Figures in USD

Bottom up approach (advantages/disadvantages)

Accumulation control perspective

- More accurate control when awareness is sufficient in the underwriting community, when specifically flagged and/or priced
- More real time exposure to monitor, steer the capacity, especially for not long lasting scenarios
- Frequency less of an issue as physical phenomenon

Pricing and costing perspective

- More meaningful on contract level as more granular information on the treaty/policy structure, scope covered and exclusion
- Probably less systematic risk of over or under.-estimation, depending on the automation level of pricing calculation

Key questions

Knowing now the context and what is already there and on going, we would be interested in your expert view on:

1) How can we improve the quantification ?

2) How can we improve cross.-benefits between on going similar projects (e.g. cyber risks) ?

3) Should we not push for closing the gap instead of just restricting the risk ?
What would it need ?

4) How can we be sure to influence, inform sufficiently the right stakeholders at the right levels ? What do we need for this ?



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