

Moving beyond history: A loss driver approach to projecting and quantifying casualty exposure

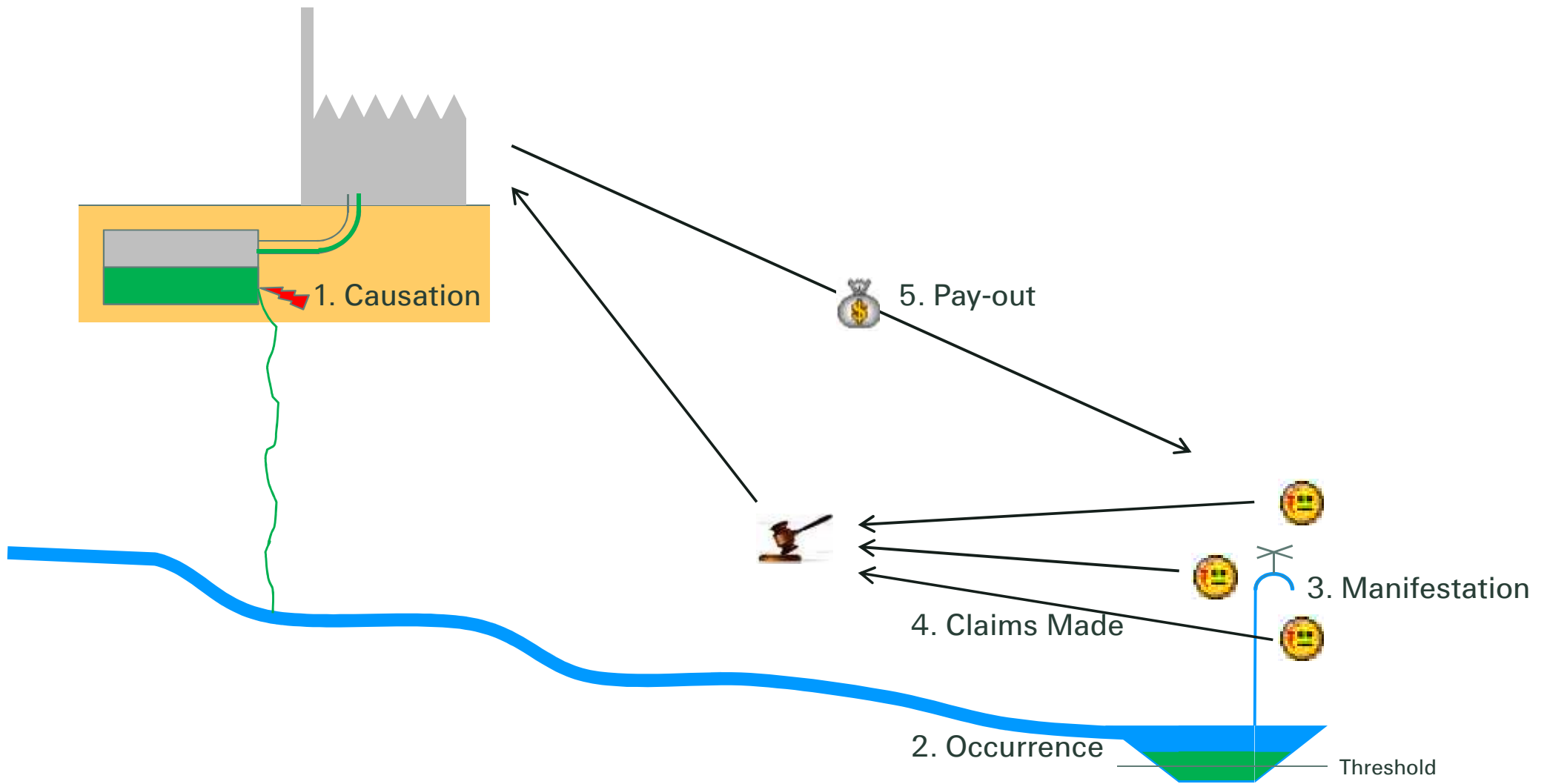


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Agenda

- **The Casualty Context**
- An Existing Exposure Approach
- Towards Liability Risk Drivers
- Modelling Liability Risk Drivers
- Indicator Retrieval
- Data Analysis
- Application of LRD (Examples)
- Potential Collaborations on Data Analysis
- Q & A

The Casualty Context



Liability Valuation – Need for a forward-looking approach

- Market failures lead to Liability Crises
 - inadequate premiums & rise in claims/indemnity awards
 - insurers withdraw from public liability or even default
 - no cover available for many or only at prohibitive prices
 - businesses have to close

Examples: USA mid '80s, Australia 2000
- Current approaches are
 - somehow backward looking and therefore inadequate for liability, which is long tail
 - weak in dynamic environments (emerging markets, tort reforms, etc.)
 - for RI treaties relatively unspecific with respect to industry segment and neglect other risk drivers (such as turnover size) altogether (at least on the treaty reinsurance side)



Cover of Mar. 24, 1986 issue
Property of Time Inc.

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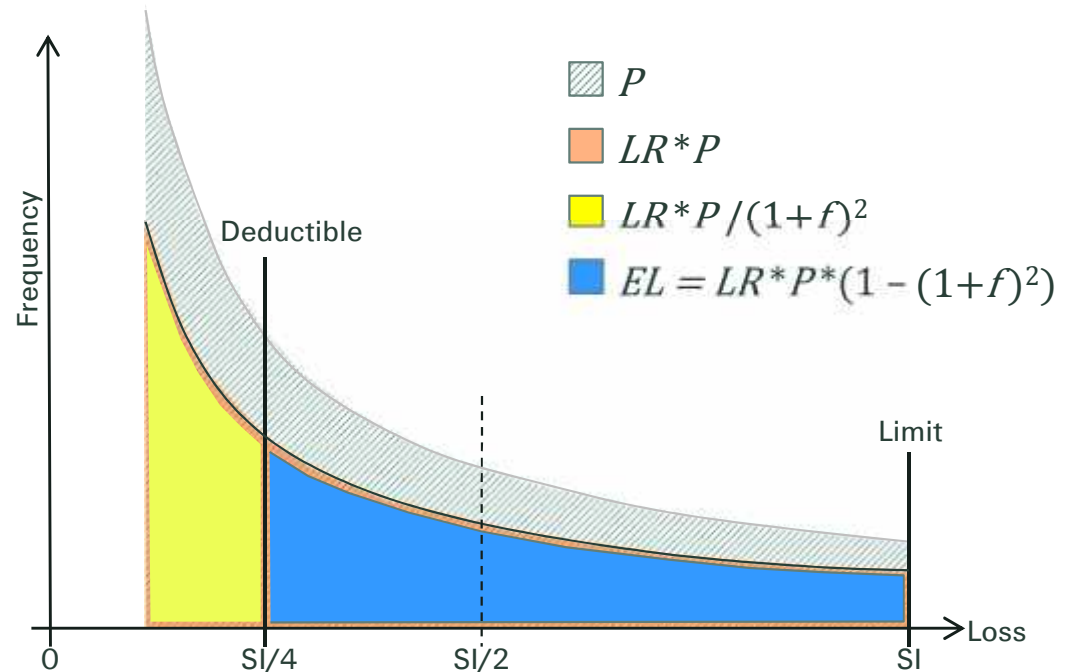
What is Increased Limit Factors (ILF)?

An approach to redistribute the cedent's premium to layers

- Premium redistribution **based on a loss ratio estimation** and a **constant double limit surcharge** (Increased Limit Factor) assumption
- All internal and external factors on losses are combined into two factors

ILF Model Overview

- The ILF approach is based on the cedent premium P , the sum insured SI , the loss ratio LR and the ILF Factor f (portion of the premium that needs to be charged additionally, if the sum insured is doubled $\rightarrow f \in [0,1]$)
- It is used to calculate the expected loss EL in the layer. In the example the layer is $(SI-SI/4)$ excess $SI/4$.
- The excess frequency is set implicitly by the loss ratio assumption.

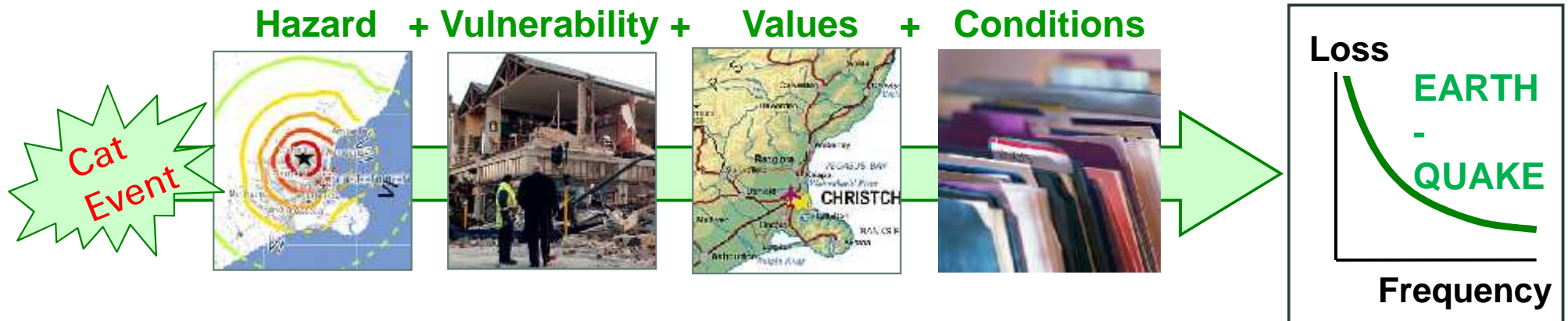


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Short vs. Long Tail: Risk Factors

Example Earthquake >> Accurate “hard” risk factors based on science, statistics, observations

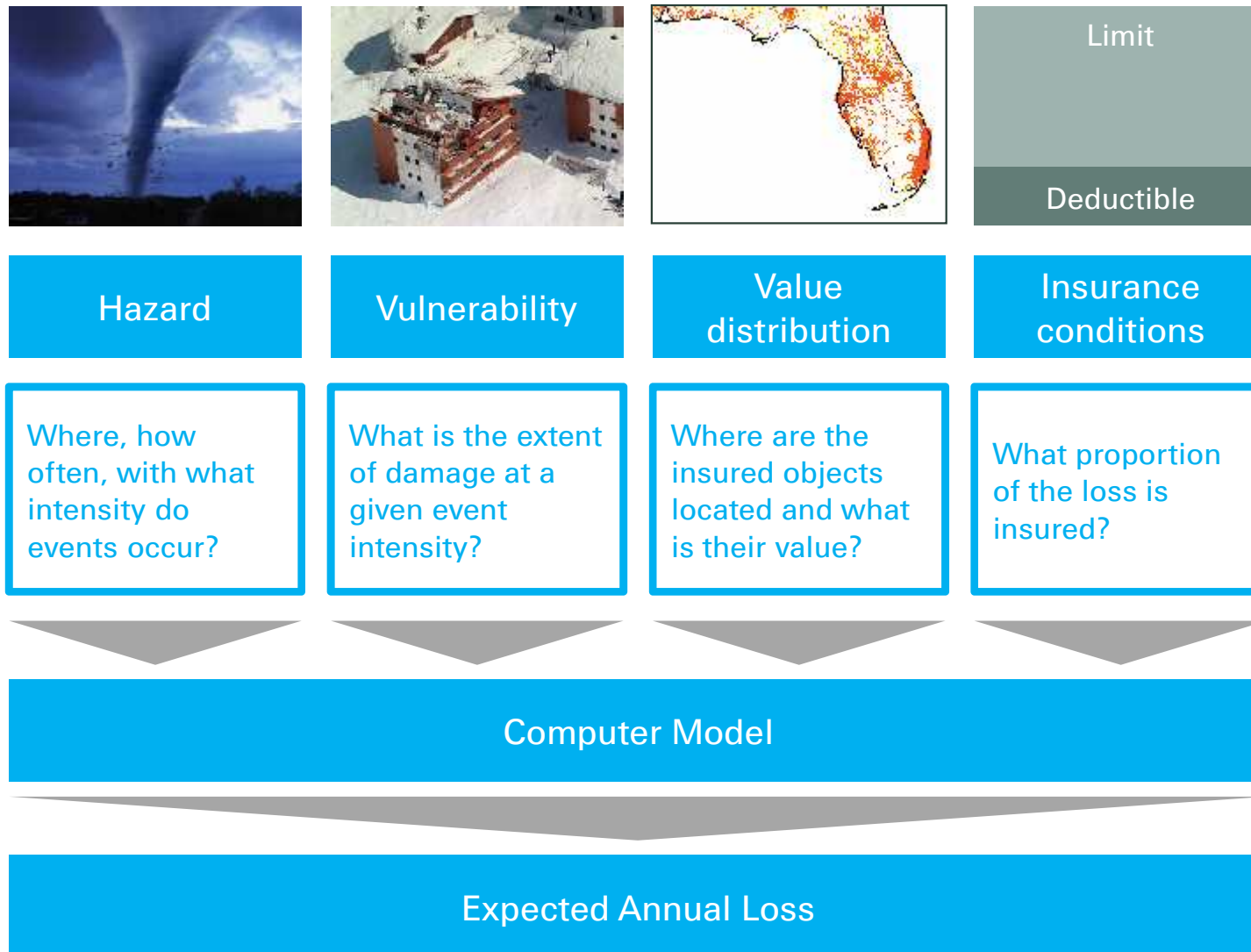


Example Liability Event >> Some “soft” experience and statistics, but what exactly “drives” the risk?



➔ Understanding what drives risk in Liability is key to improve UW quality

NatCat Modelling – The 4 Box Principle

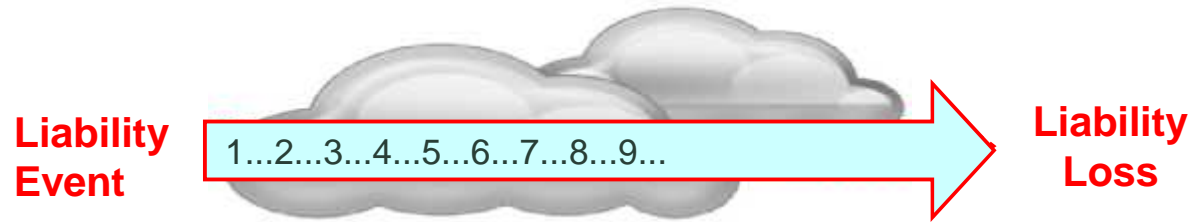


What are the Risk Drivers in Liability?

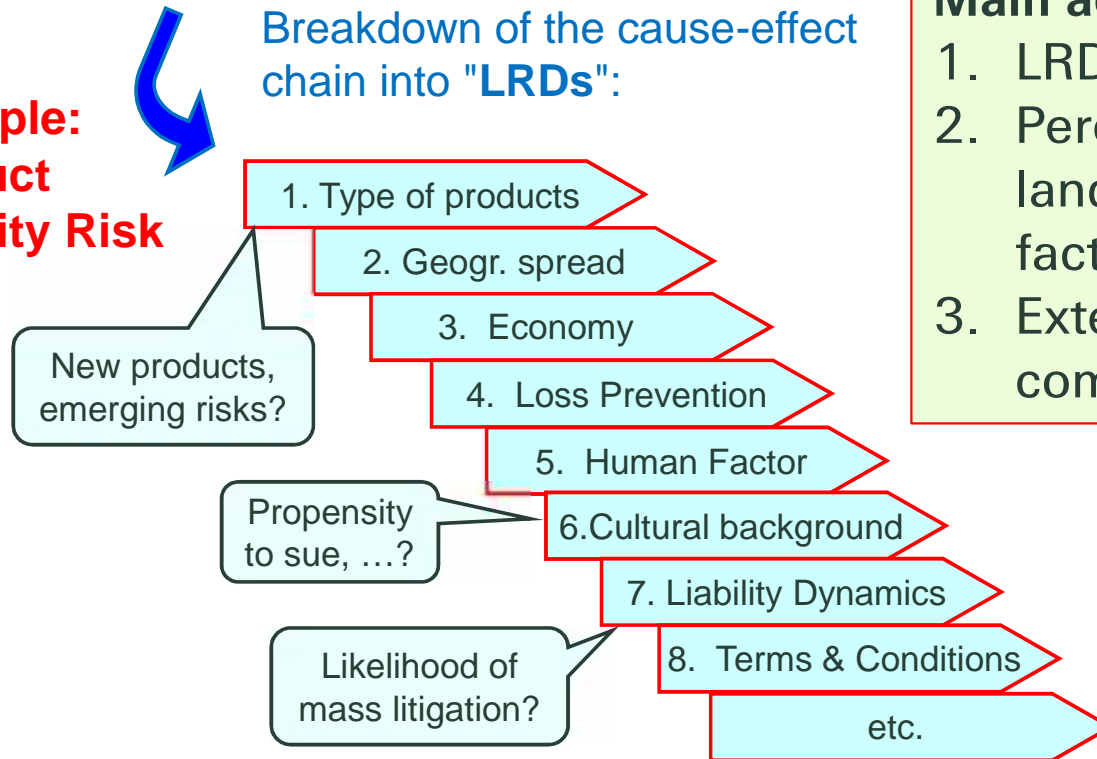


➔ Understanding what drives risk in Liability is key to improve UW quality

Swiss Re Liability Risk Drivers™



**Example:
Product
Liability Risk**



Main advantages:

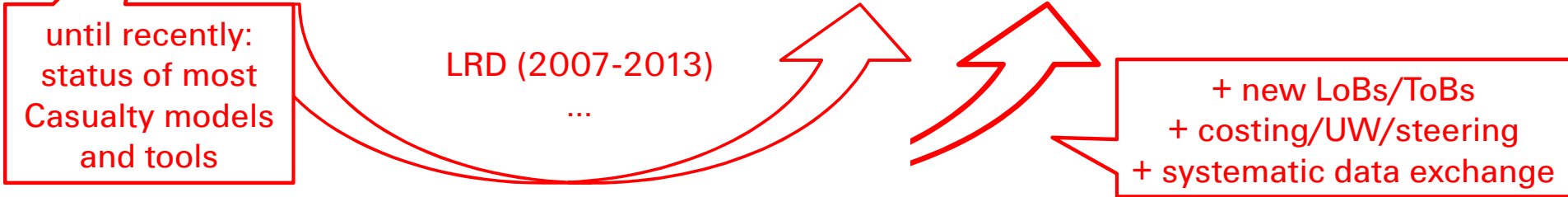
1. LRDs are periodically assessed
2. Perceived **changes** in risk landscape can **immediately** be factored in
3. External and group-wide **data** are combined to calibrate the model

**Product
Liability Loss**

Casualty vs. Nat Cat: Risk R&D and Tool Dev. History

Nat Cat

till 1970	1980	1990	2000	2013
no quantitative methods, loss surprises	first attempts for quantified risk assessment, CRESTA info plans	tools for main areas and perils, data standards and exchange	world-wide cat risk assessment sophisticated software hazard/vulnerab. data bases systematic/organized data flow	tools: DONE secondary and multiline effects? assessability limits?



Liability

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What is Swiss Re Liability Risk Drivers™?

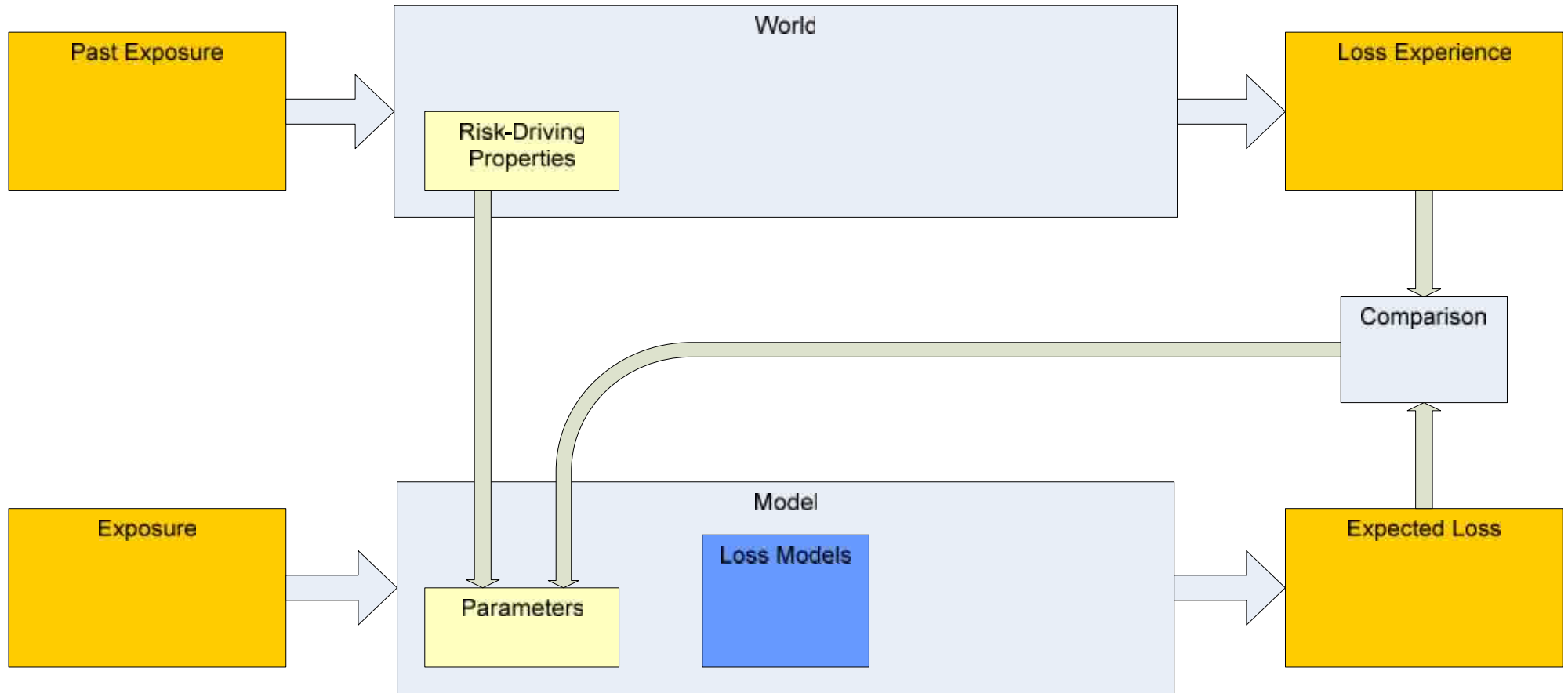
A forward-looking costing tool and loss model for Liability business

- Exposure assessment **based on a set of loss scenarios**
- Assesses **effect of internal and external factors on losses**
- Incorporates **validated** underwriter insights
- Calibrated and **validated** against reliable in-house and external exposure and **loss data**

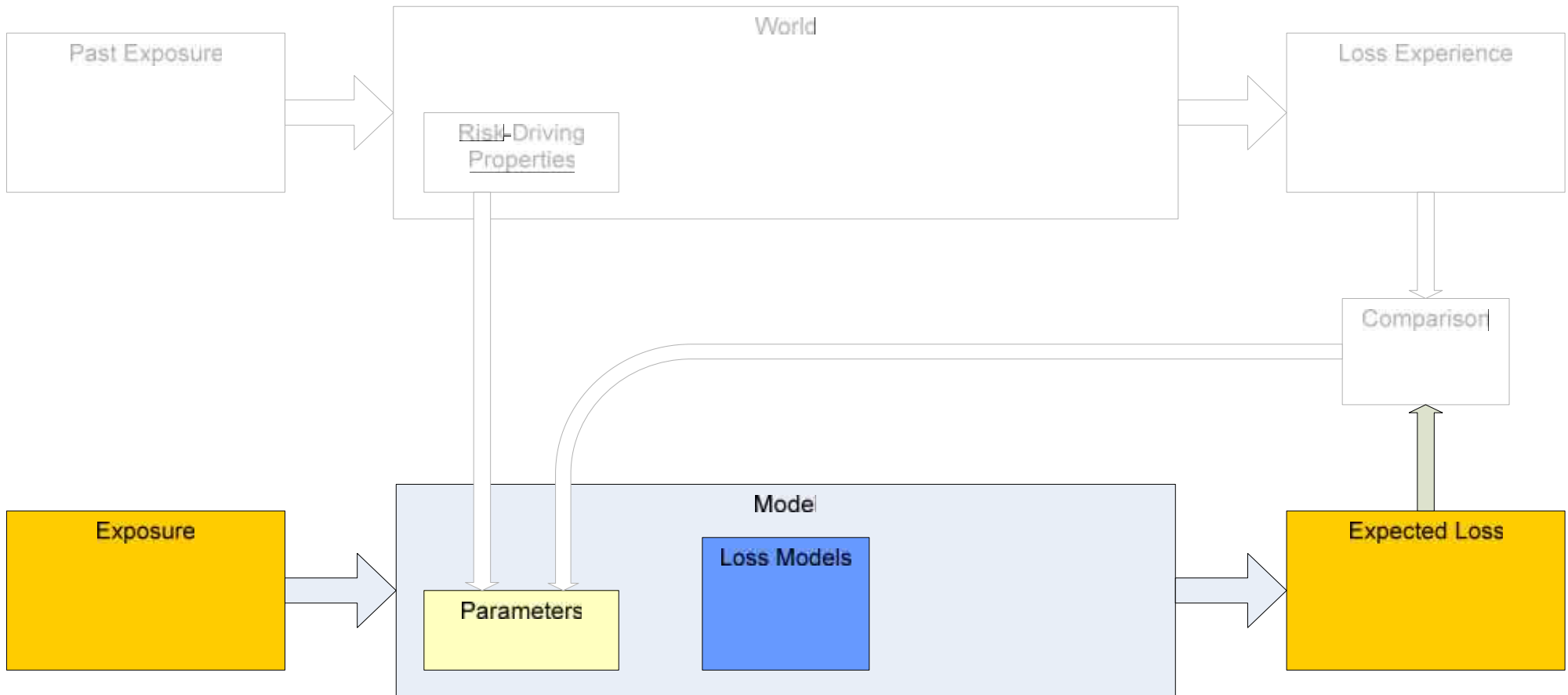
Liability Risk Drivers (LRD): Model Approach

- Calculates the expected loss costs of the (re)insurance layer starting from a set of **loss scenarios**
- Assesses the impact of (changes in) **key factors** (e.g. legal environment) on the expected loss
- Evaluates effect of (re)insurance **terms and conditions** on the expected loss (e.g. sub-limit per victim, Spain)
- Past **experience** is used as **testing** environment to calibrate/verify the model's outcome
- Due to its modular approach it can be **extended** (e.g. new drivers, new scenarios) only by adapting the corresponding module

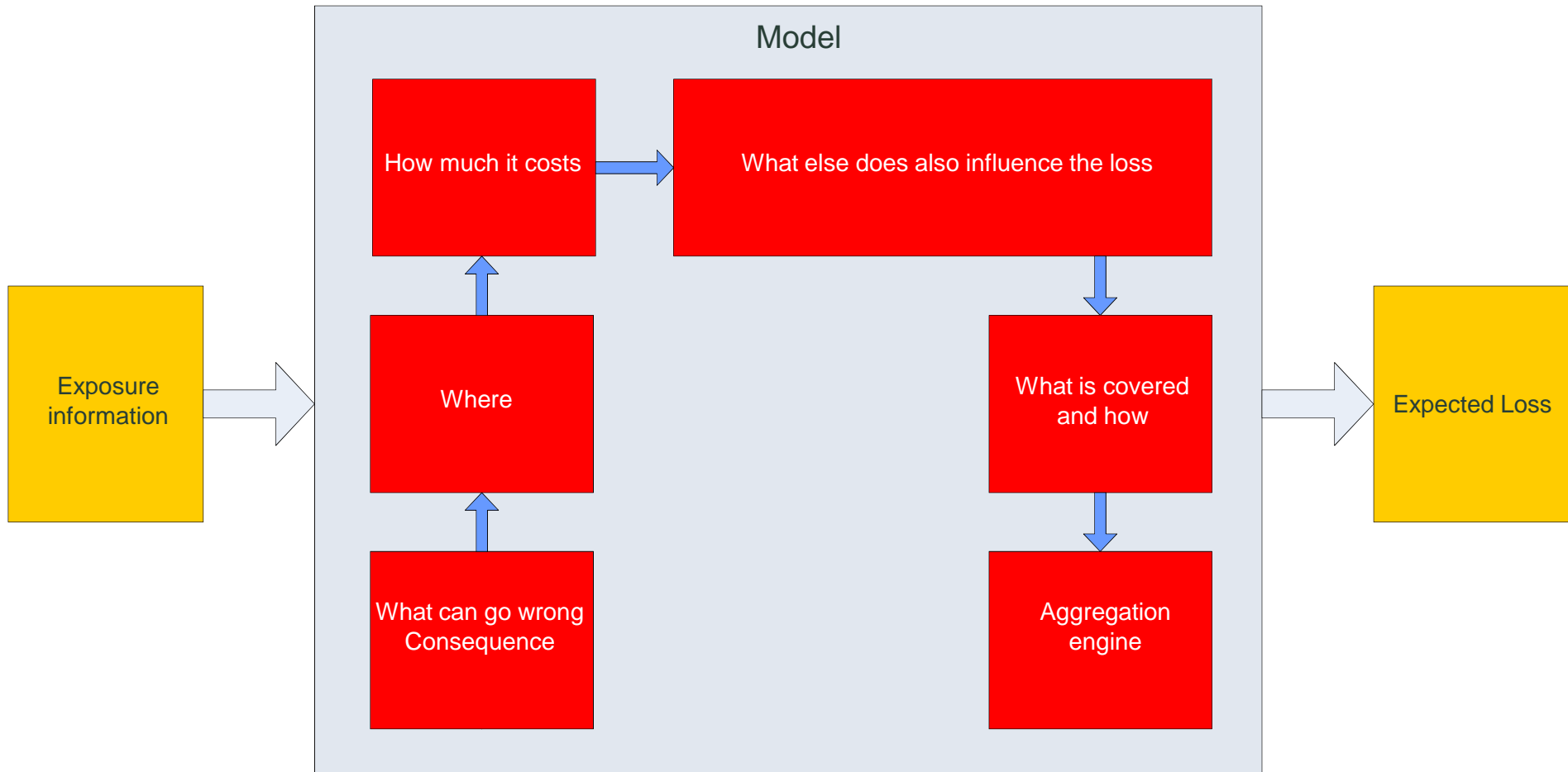
Model Context



LRD Model



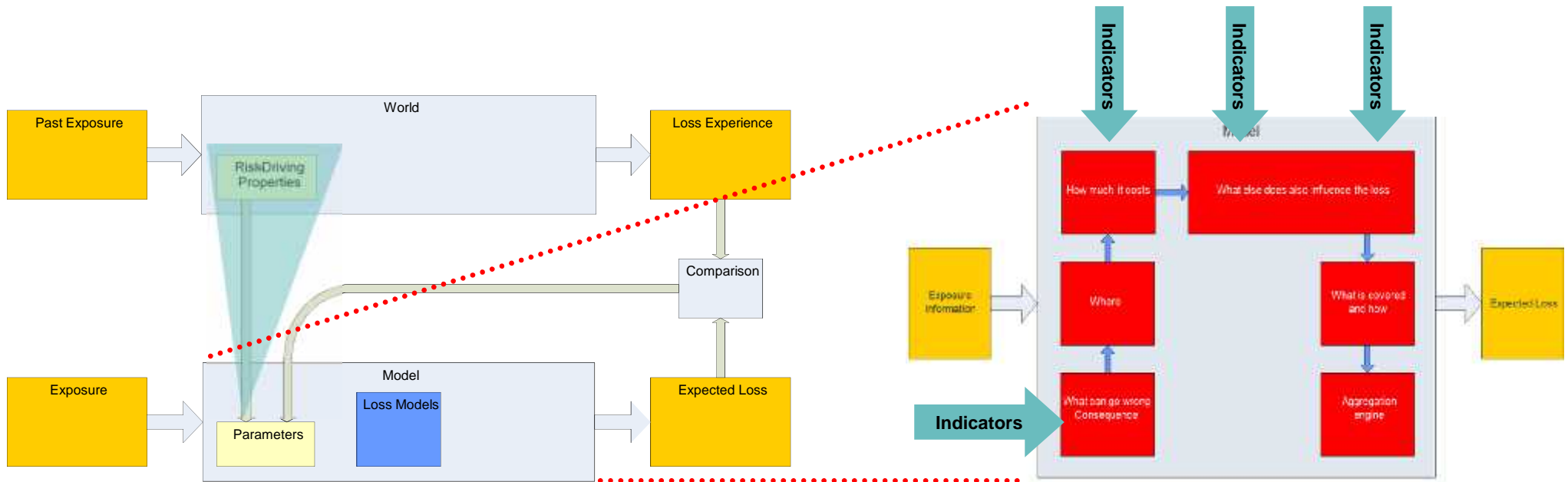
Model Overview



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Indicator Retrieval: Make the LRD Model work!



- Regular and sudden retrieval and processing of indicators/drivers on a broad geographic scale
- Implementation of an indicator retrieval tool to automate model feed (where sensible)

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Model Calibration

Here enters
loss experience!



- *Reality check* for model output with **loss data**
- Calibrate the “raw” model to reproduce the loss data for one country
- The calibrated model output is then verified for other countries by changing only *known* parameters
 - from risk driver indicator retrieval
- Results are continuously tracked

LRD Prediction for Country A and B verified

oil blue: country A data fit

red: country A, LRD

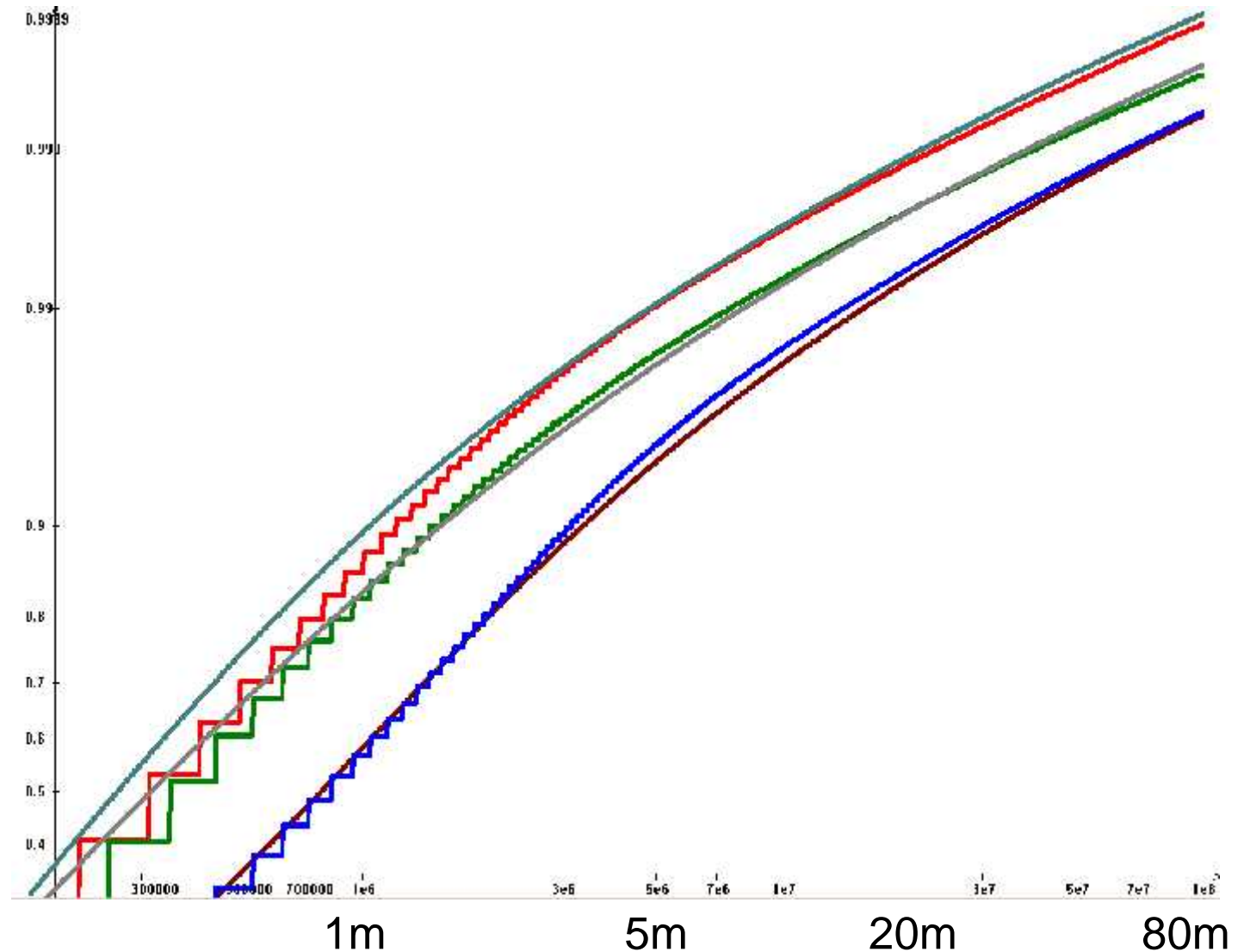
grey: country B data fit

green: country B, LRD

Calibration:

brown: country C data fit





blue: country C, LRD



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Application of LRD

 1. Portfolio Risk Analysis	Decomposition of an insurance portfolio into key risk drivers
 2. Tariff Indicator for Emerging Markets	Calculation of expected loss and identification of major risk drivers in different high growth countries
 3. Scenario Analysis	Portfolio impact analysis based on legal and societal developments
 4. Casualty Cat Modeling	Calculate impact of various casualty cat scenarios on client portfolio (work in progress)

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Data Analysis Collaboration

- What are the liability risk drivers in your portfolio?
- We are always motivated to investigate the risk drivers in collaboration with clients willing to share their data.
- We can offer a wide range of data analysis services (based on your data, enriched with SR data) according to **your needs and interests**:
 - Loss frequency vs. company size
 - Loss severity vs. company size
 - Loss severity vs. purchased limit
 - Granularity and number of losses permitting: Differentiation by industry
 - ...

Q & A

Thank you



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