

A dramatic photograph of a lightning bolt striking a city at night. The lightning is a bright, jagged white and yellow streak against a dark, stormy sky. The city lights are visible in the lower left corner, appearing as a cluster of small, glowing points.

Exposure Data in CAT Modeling

The Role of Standardized Exposure Data in
Catastrophic Modeling



Presentation Roadmap

1. → Short introduction in Exposure Data and CAT modeling
2. Steps towards ACORD exposure standard
3. Conclusion

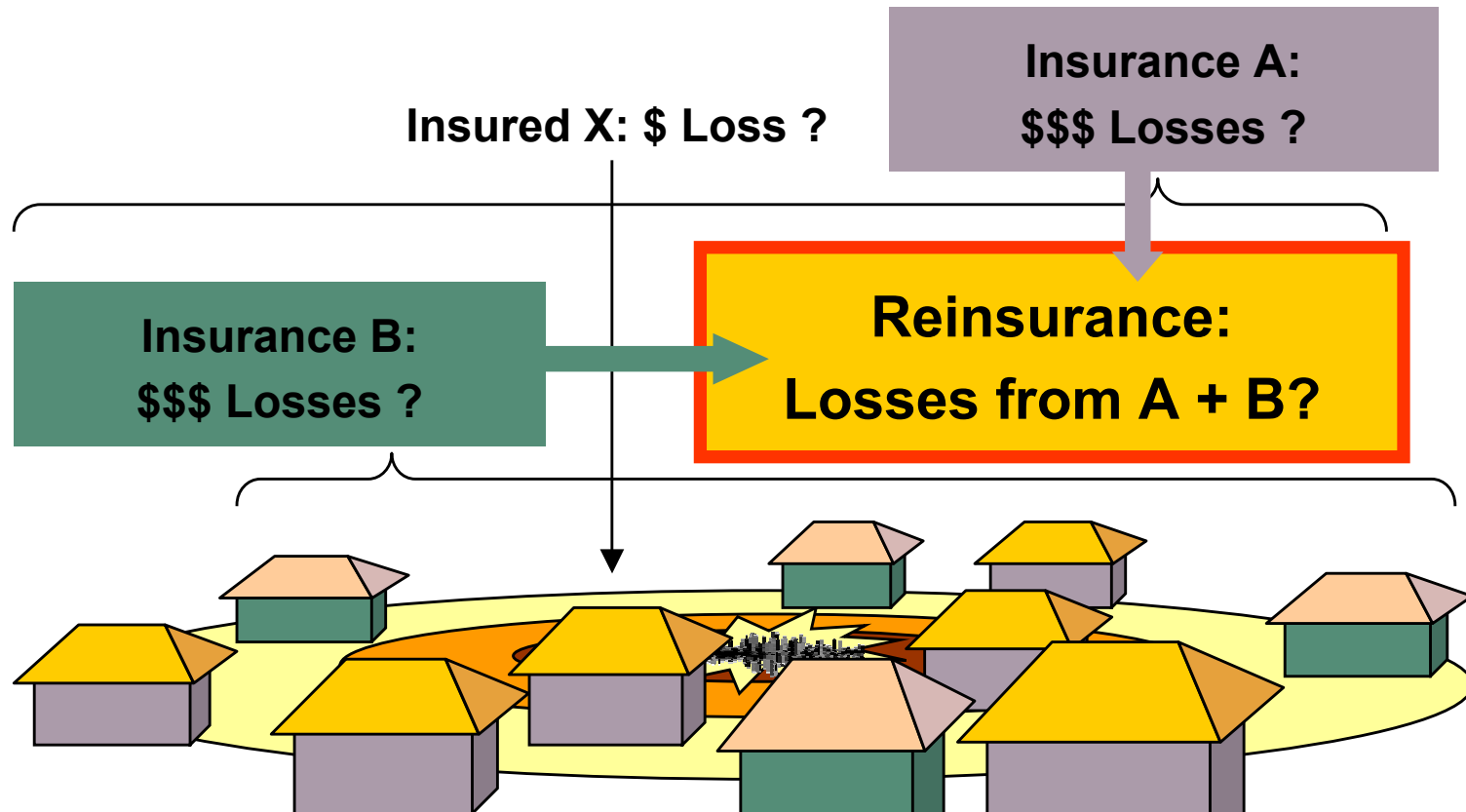
Exposure Data in CAT Modeling

- Collection of exposure data improved significantly over the last decade – especially in the U.S. after hurricane Andrew (1992) and the Northridge earthquake (1994).
- The importance of good data is now widely accepted to be a key element for assessment of loss potentials – high quality data are the basis for probabilistic loss analysis
- However, the various formats of presenting the data needed cumbersome processing and also led to ambiguous interpretations of reported data fields.

CAT Modeling: Purpose

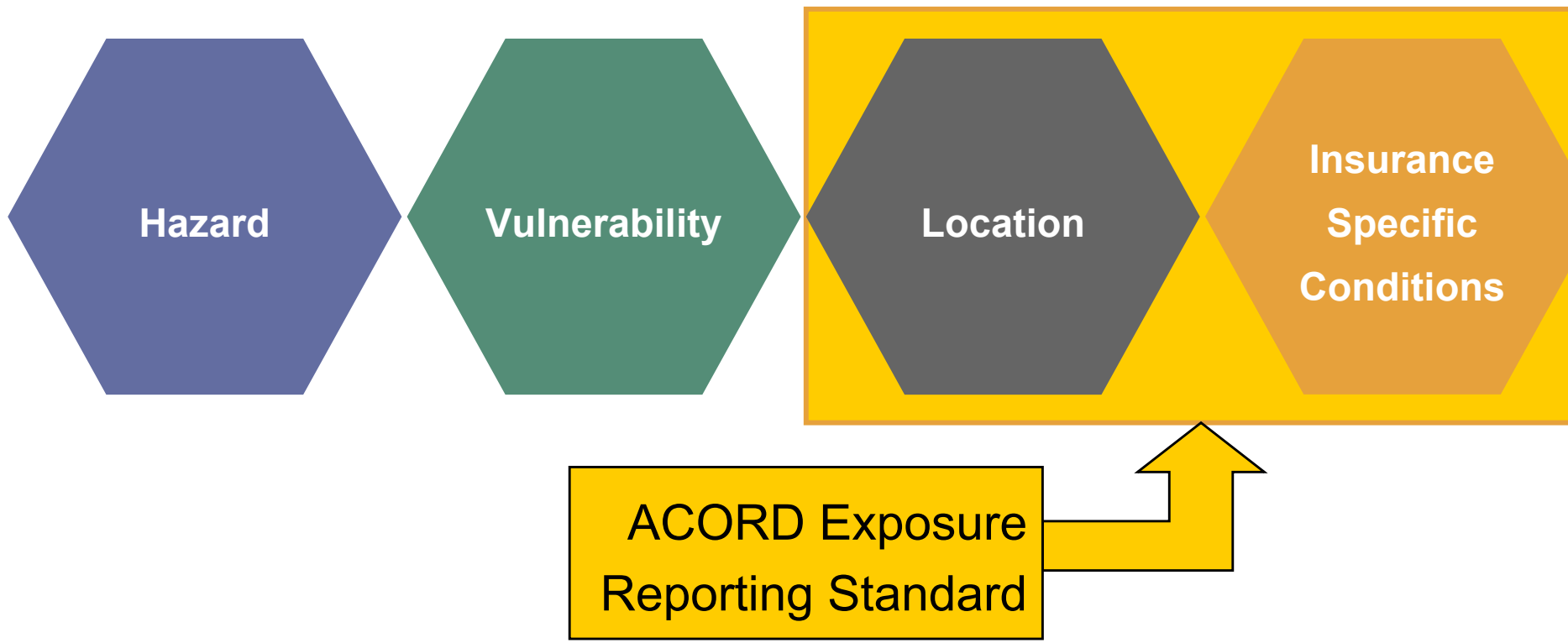
CAT models in the (re)-insurance industry are used to:

- Estimate the 'Average Annual Loss' → contract quotation
- Assess and monitor risk accumulation



CAT Modeling: Basic Concept

- Basic concepts of CAT models are the same – regardless of the region or peril modeled
- CAT models can be split into 4 modules:



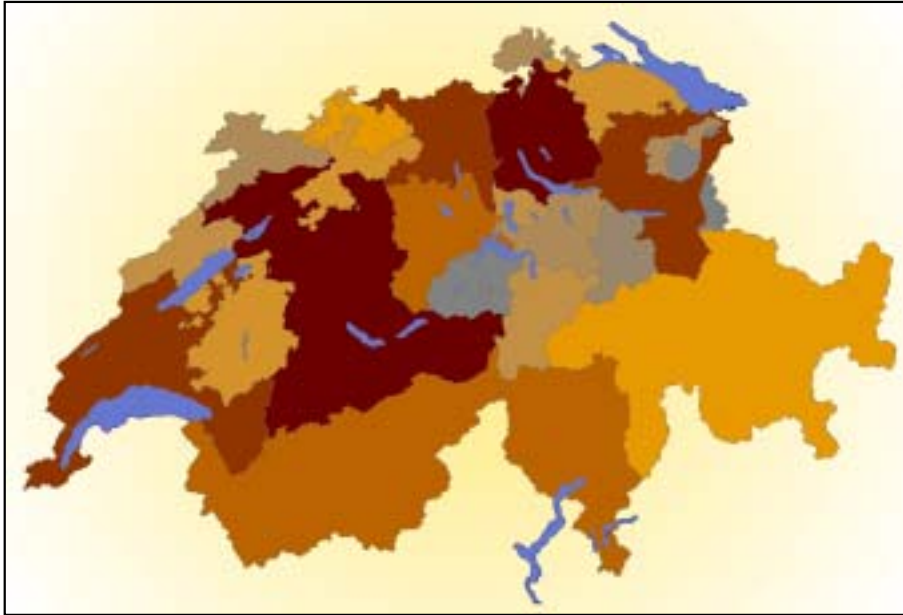
The 4 Components of CAT Models

- The hazard component estimates the severity / intensity and frequency of possible future events. This typically results in a set of stochastic events for a selected peril and region.
- The vulnerability component estimates the damage for each of these stochastic events and for each location given that an event occurred.
- The vulnerability component uses as input location characteristics (geo reference, building structure etc.).
- The insurance component calculates the insurance (or reinsurance) loss for each location and event based on the damage coming from the vulnerability component

Switzerland Earthquake Exposure

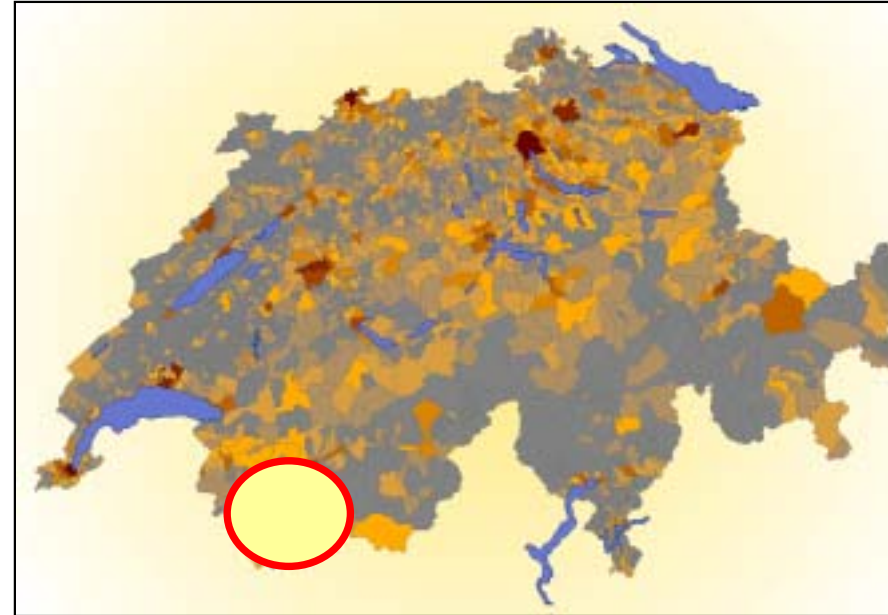
Aggregated Resolution:

Insured Values by State (CRESTA)



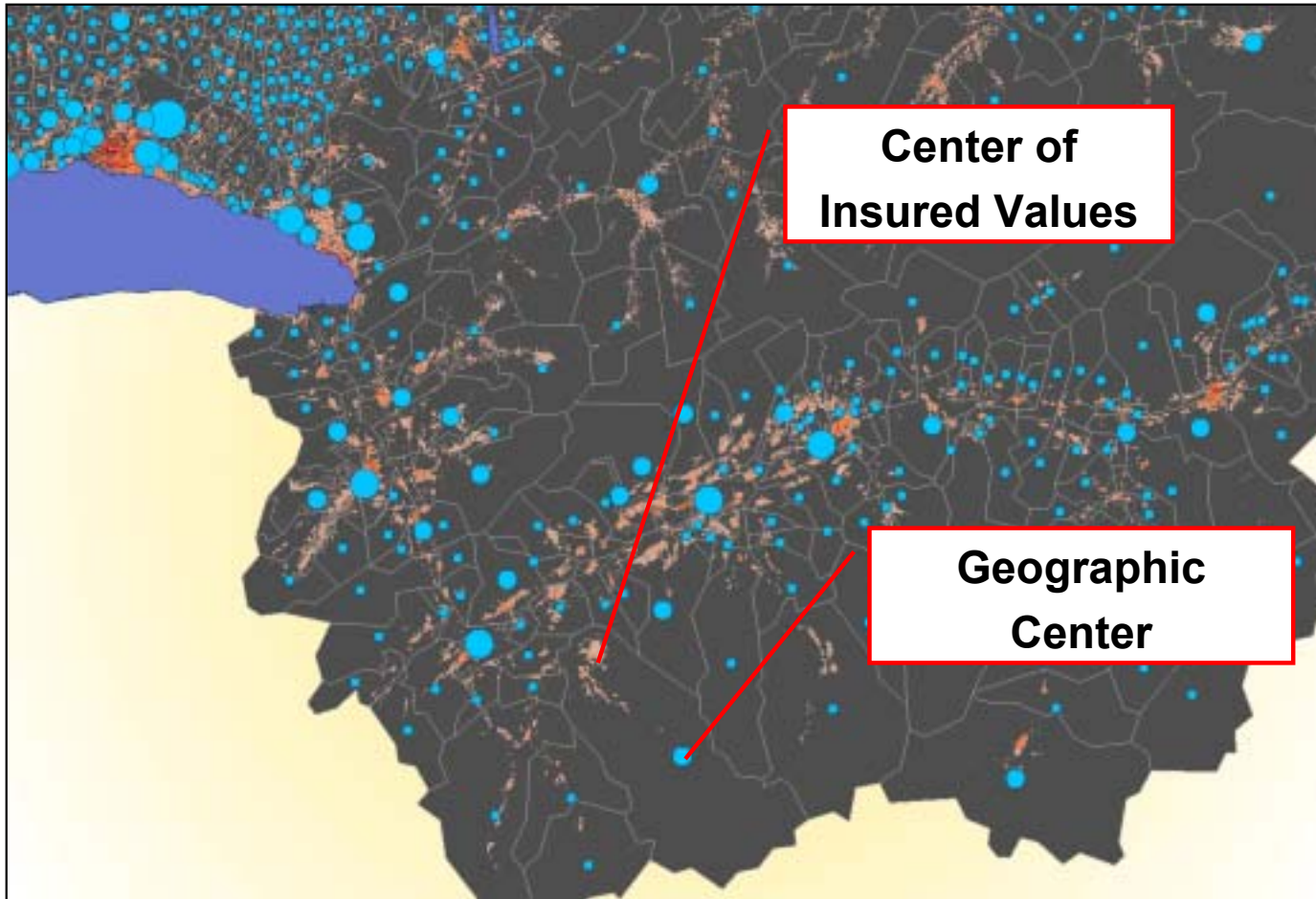
Detailed Resolution:

Insured Values by Community



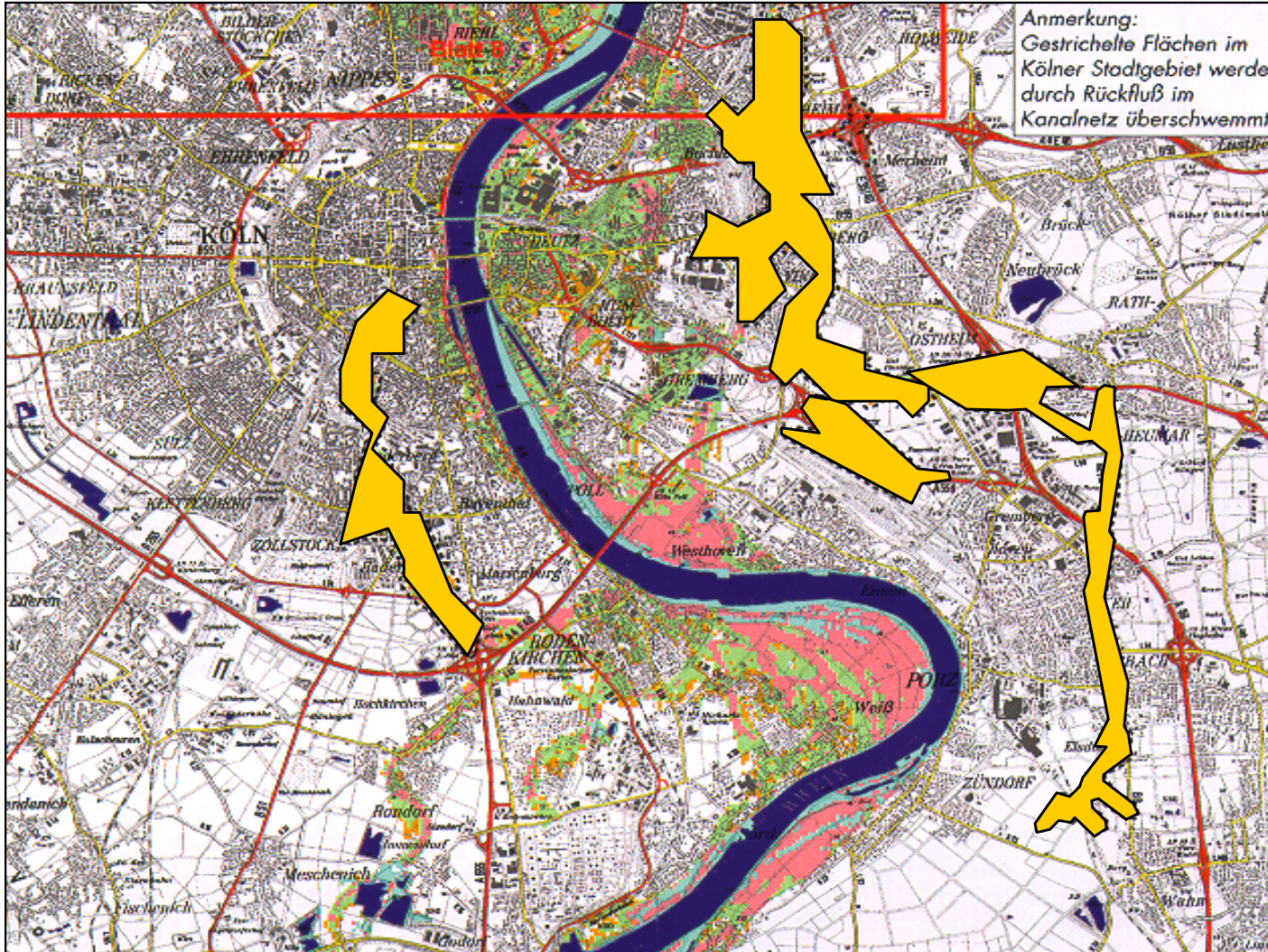
- Usually CRESTA level exposure is not detailed enough
- Sometimes CAT models require even more than community level data

Switzerland Earthquake Exposure



- If exposure is attributed to geographic center, you might make a large mistake → exposure should be geo-referenced, i.e. latitude and longitude

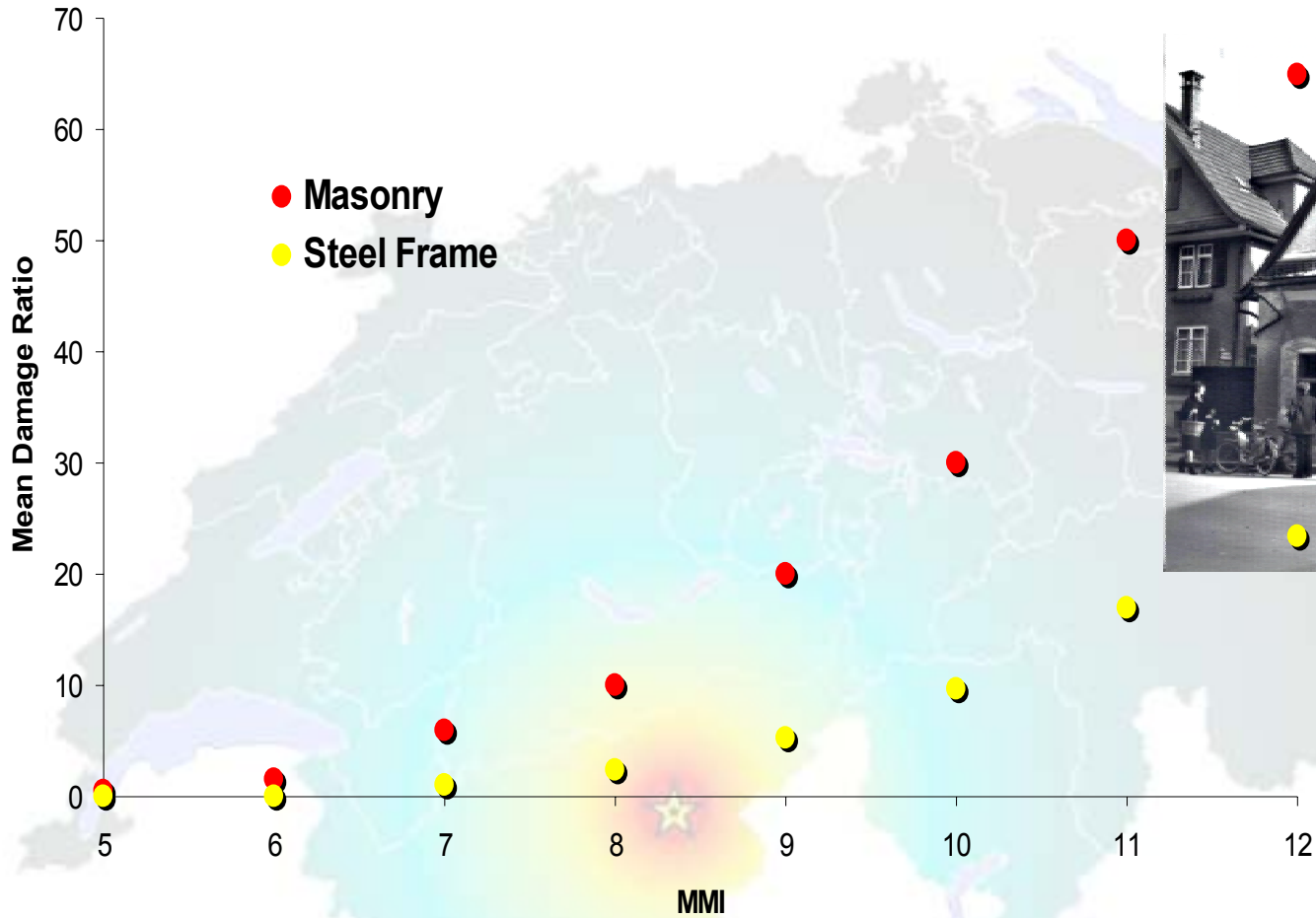
Flood Exposure



Flooding expected close to river (blue, red, green colored areas)

BUT: shaded area gets flooded too!

Building Structure / Construction



Important Location Data For Perils

■ Earthquake:

- Local soil conditions
- Building structure
-

■ Wind perils:

- Distance to coast
- Local terrain effects
- Roof type
-

■ Flood:

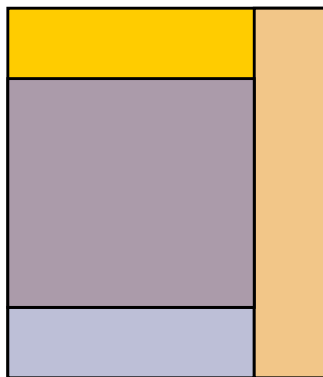
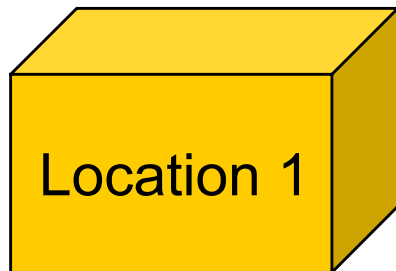
- Elevation of site
- Number of stories of building
-

■ Terrorism:

- Urban accumulation control → street level data
- Vicinity of potential terrorism targets
-

Insurance Specific Conditions – 1

Single Location:



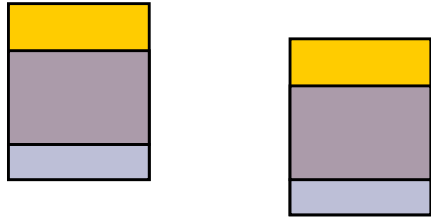
General attributes:

- Address
- Insured Values (Building, Content, ...)
- Construction & Occupancy Type

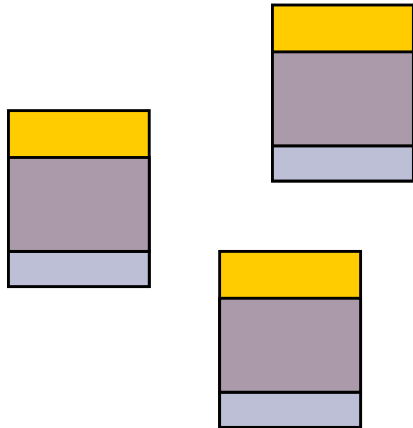
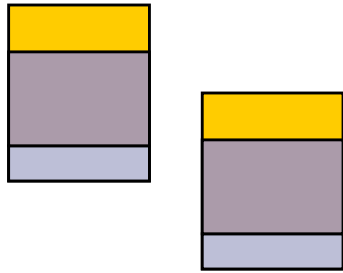
Insurance specific conditions:

- Deductibles
- Limits
- Coinsurance

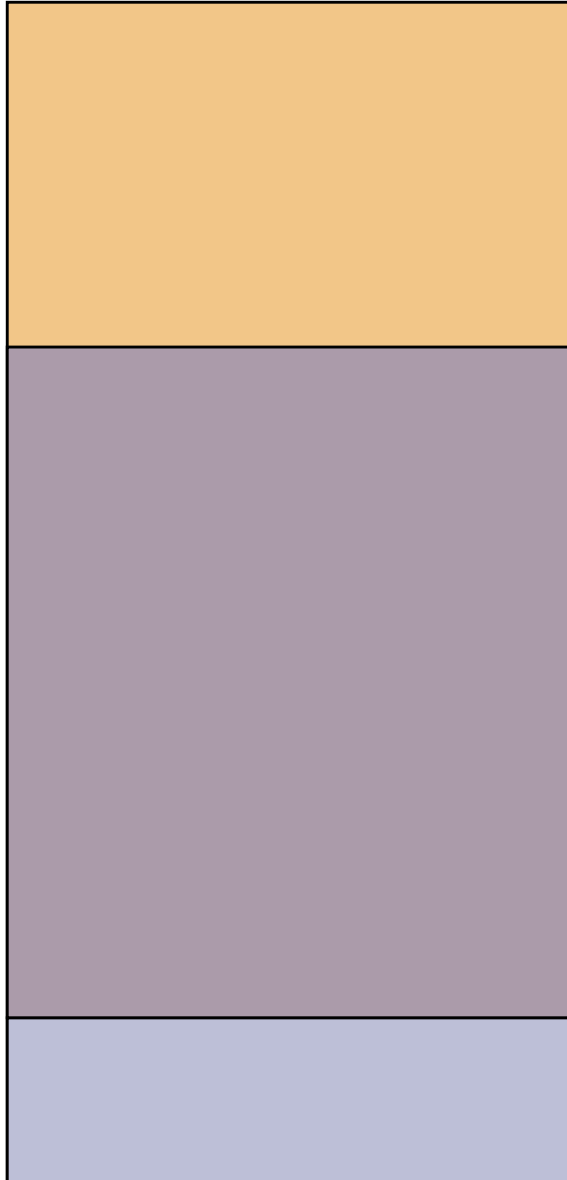
Insurance Specific Conditions – 2



■ Ded./ Limits per **location**

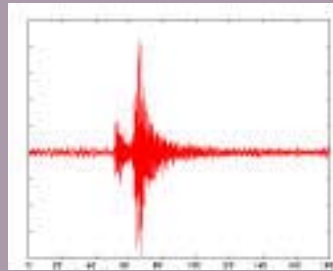


Insurance Specific Conditions – 3



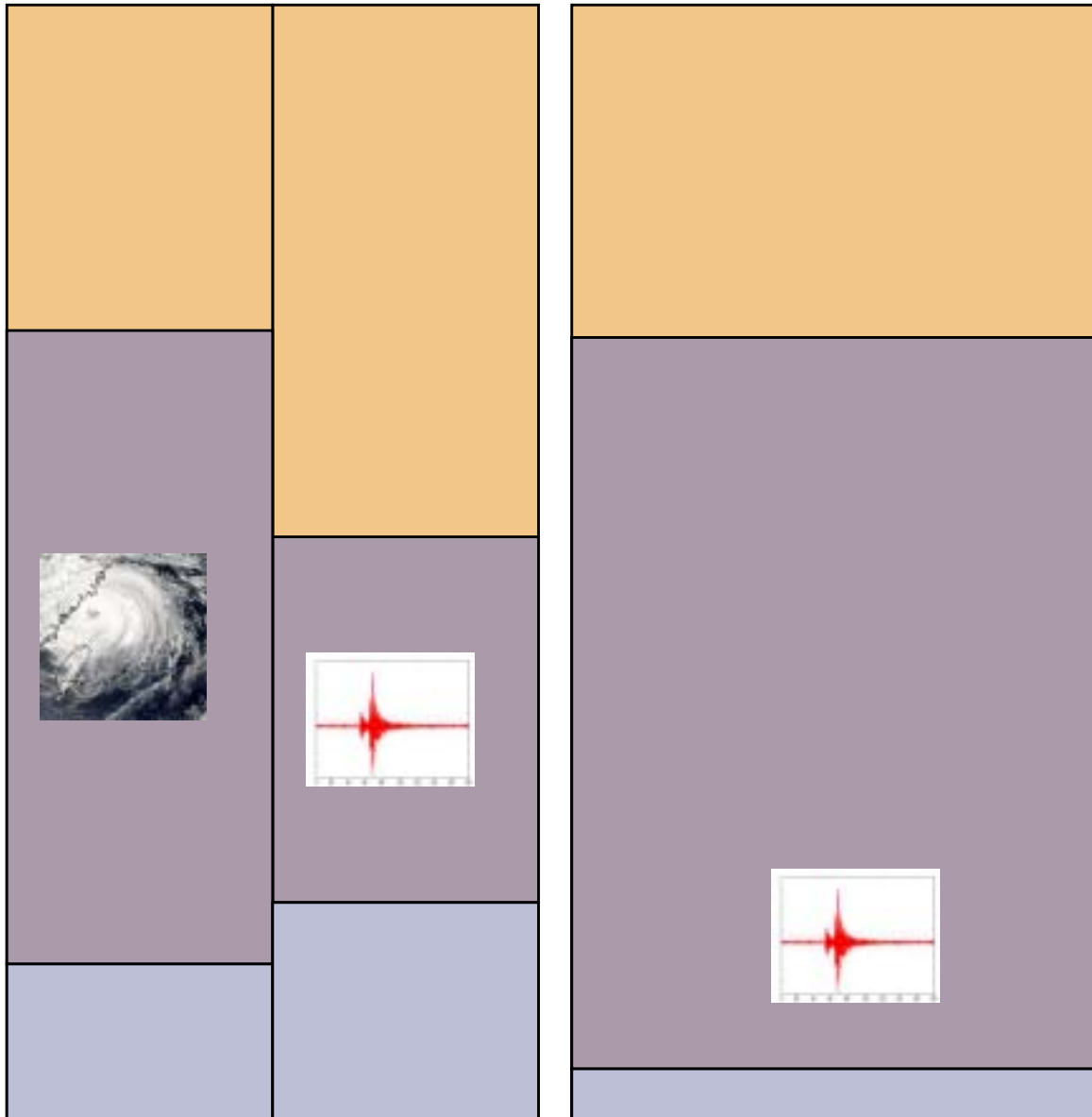
- Ded./ Limits per location
- Ded./ Limits per 'policy'

Insurance Specific Conditions – 4



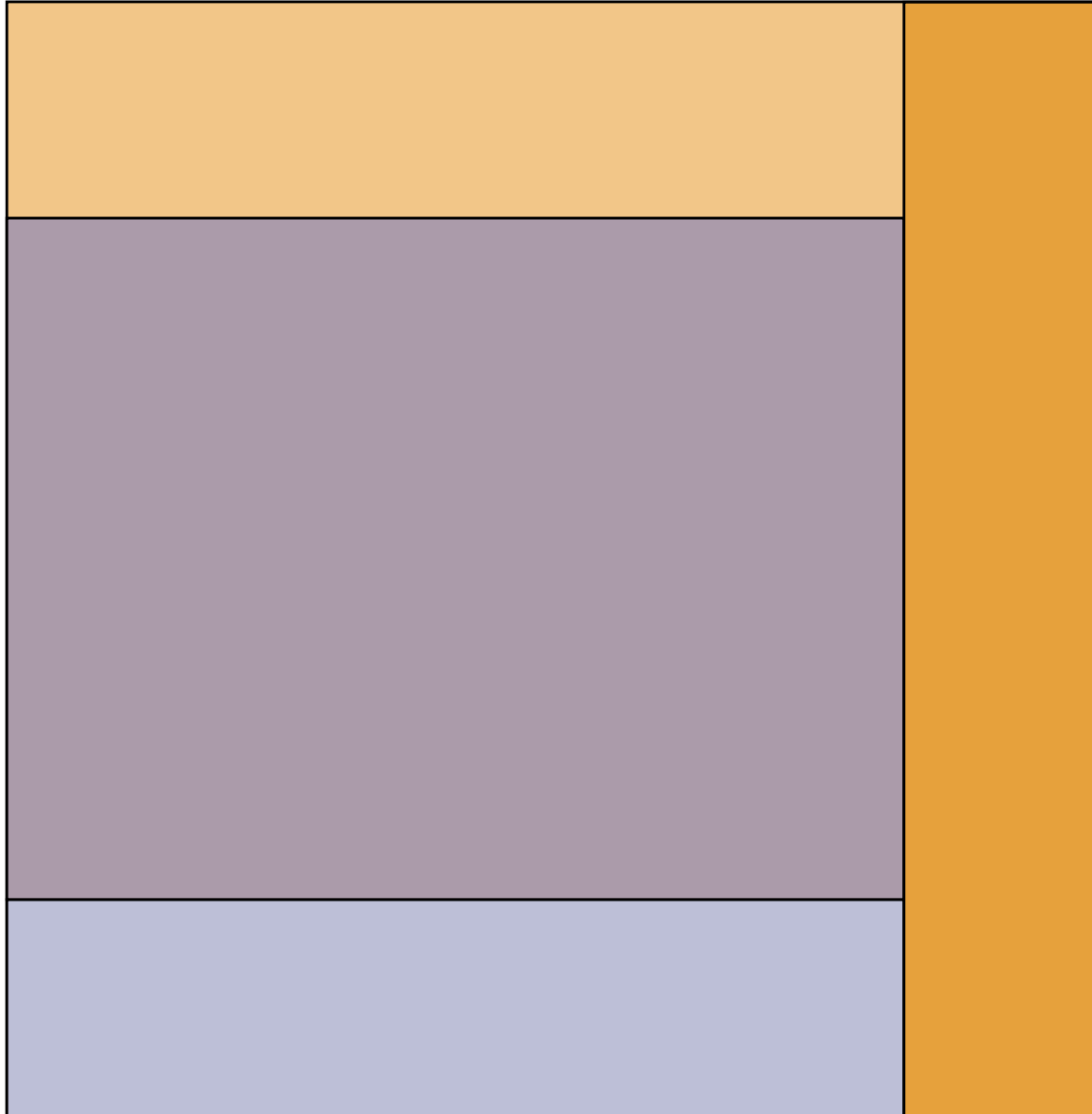
- Ded./ Limits per location
- Ded./ Limits per 'policy
- Ded./ Limits per 'policy
AND peril

Insurance Specific Conditions – 5



- Ded./ Limits per location
- Ded./ Limits per 'policy'
- Ded./ Limits per 'policy' AND peril
- Ded./ Limits per 'policy' AND peril AND geographic region

Insurance Specific Conditions – 6



- Ded./ Limits per location
- Ded./ Limits per 'policy
- Ded./ Limits per 'policy
AND peril
- Ded./ Limits per 'policy
AND peril
AND geographic region
- Portfolio made up of
different policies

Presentation Roadmap

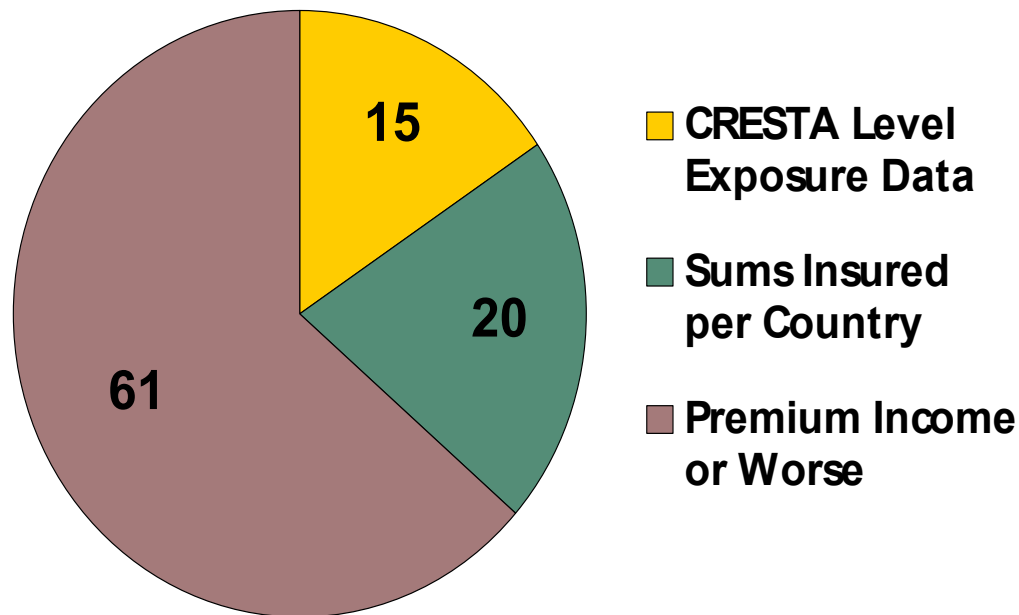
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European Winter Storms 1999

- In 1999, European winter storms Lothar, Martin and Anatol surprised some insurers and reinsurers with the level of damage they created in highly insured urban areas in France and Denmark.
- Many insurers were not adequately covered for these events – reflecting an industry-wide inability to properly predict the behavior of these storms and the losses that would follow them.
- These storms raised reinsurers' awareness of the need for high-quality exposure information to allow proper risk management, and to raise awareness among clients and brokers that reinsurers are increasingly insisting upon more complete and detailed information.

Exposure Reporting – 1999

- A study of RMS (24 August, 2000) stated that 96 companies reported the following exposure information for European business:



- ➔ Reported exposure information has to be improved in order to properly run CAT models

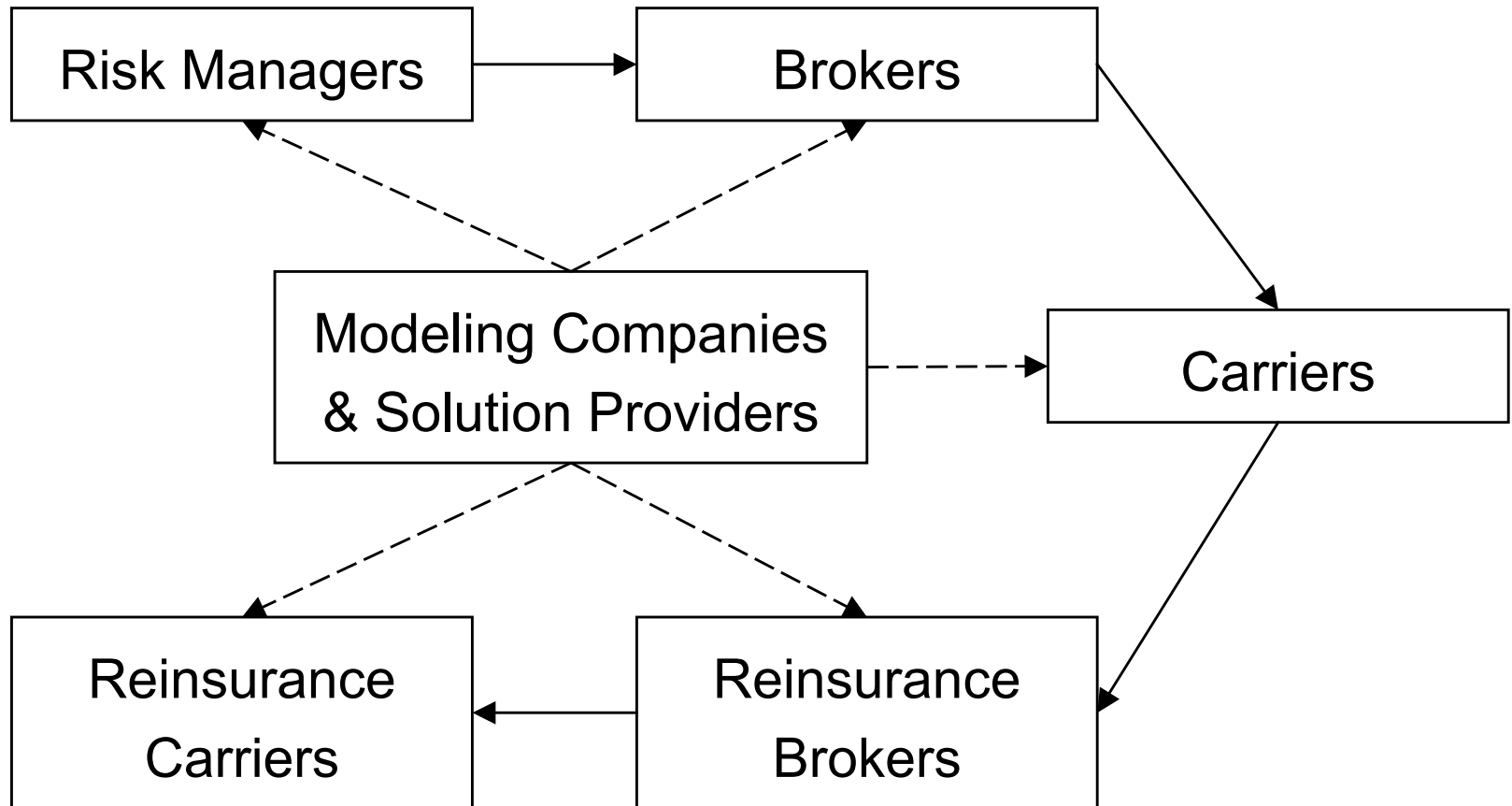
CREST*Aplus* Initiative

- In August 2000, Converium (formerly Zurich Re) invited all market participants (i.e. primary insurance companies, brokers, reinsurance companies, modeling companies) to a reinsurance roundtable in Paris. Their goal was to discuss and develop market standards on enhanced exposure information for Eurowind and implementation strategies for the future.
- In 2001, the new standard CREST*Aplus* was released – as a more flexible enhancement to the CRESTA standard.
- A revised and more detailed version was introduced in 2002 – focusing on Japanese policy structures (multi location, first loss, reduced indemnity).

ACORD Exposure Workgroup

- In 2003, ACORD initiated a workgroup in order to define an exposure reporting standard:
 - Industry-wide
 - Worldwide
 - Capturing location details
 - Merging advantages of existing standards (e.g. UNICEDE well established in US for aggregated data, CRESTAplus known in Europe / Japan, RMS data standards, etc.)
- Standard was released in August 2003.

Implementation: Information Chain



Implementation

- ACORD working with risk manager associations – to ultimately implement the standard at the very beginning of the worldwide insurance and reinsurance information chain:
 - RIMS
 - AIRMIC
 - FERMA
- Solution providers recently certified by ACORD
 - RMS
 - Room Solutions
- Promoting work with major brokers

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Implementation: Benefits

Increased efficiency in risk assessment and quoting / underwriting process:

- Less interpretation of exposure data – same understanding of reported data
- No additional preparation of exposure data – all data requirements satisfied within a single data format
- Direct import of exposure data into CAT modeling tools

Increased quality of CAT modeling:

- High resolution data easy to handle
- More detailed risk information becomes available

Do you have any questions?

