



A2: Risk modelling, systemic risk and complexity:

Quantification of What are the limits to diversification?

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Risk Management

■ Identification/Awareness

- perception is based on a *shared mental model* that can be conceptualized

■ Quantification

- From conceptual to *quantitative model*

■ Mitigation

- Explore *options* (prevention/preparedness/transfer) based upon quantification

→ Transfer

- costing of options: need for *integrated* models: loss costs (expected loss over whole frequency range, incl. extremes), cost of capital (or 'for capacity')
- portfolio management → diversification

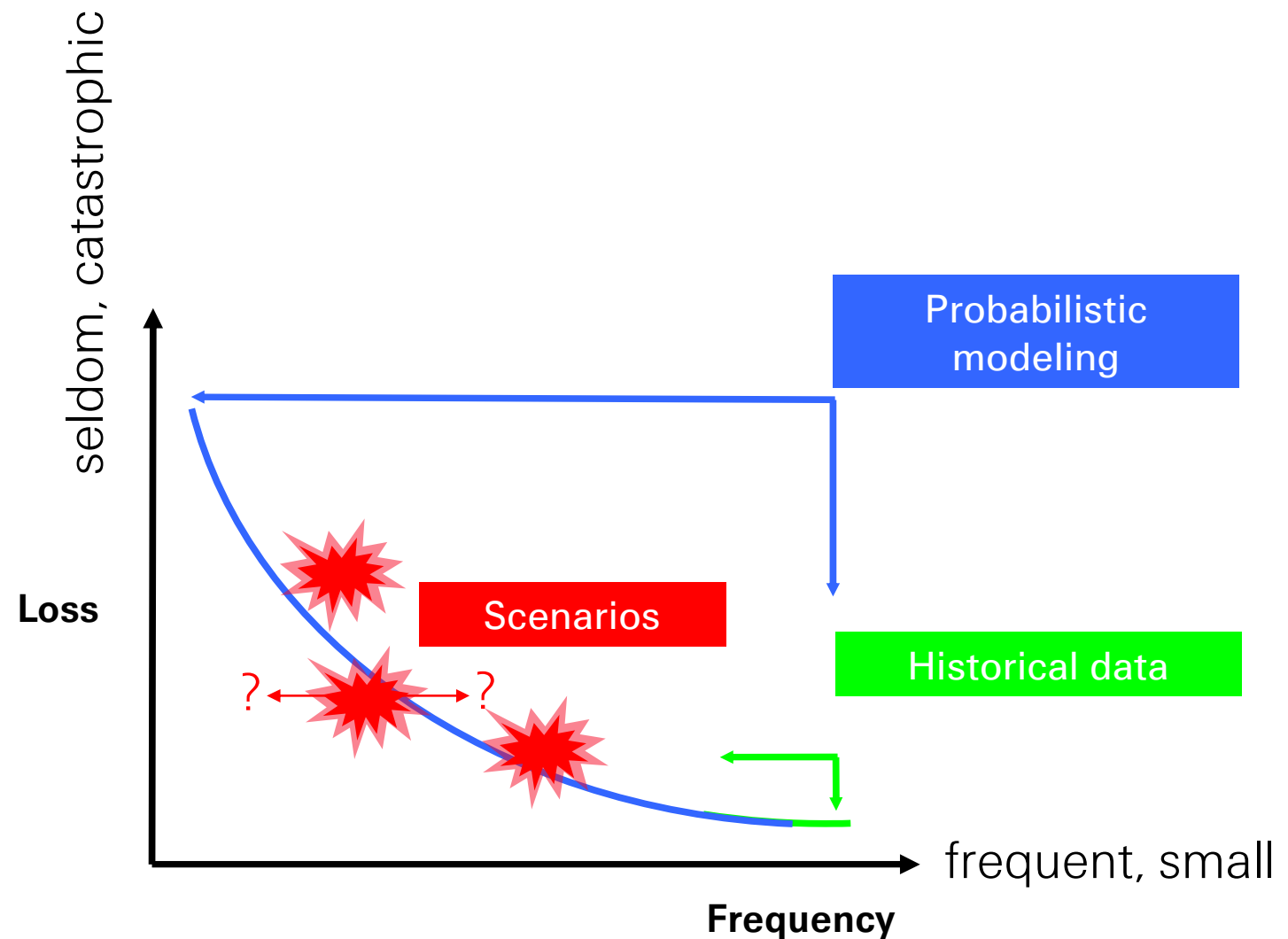


Risk Quantification

Historical data:
the basis, good to know the average outcome
but very limited (worst case most times did not happen yet)

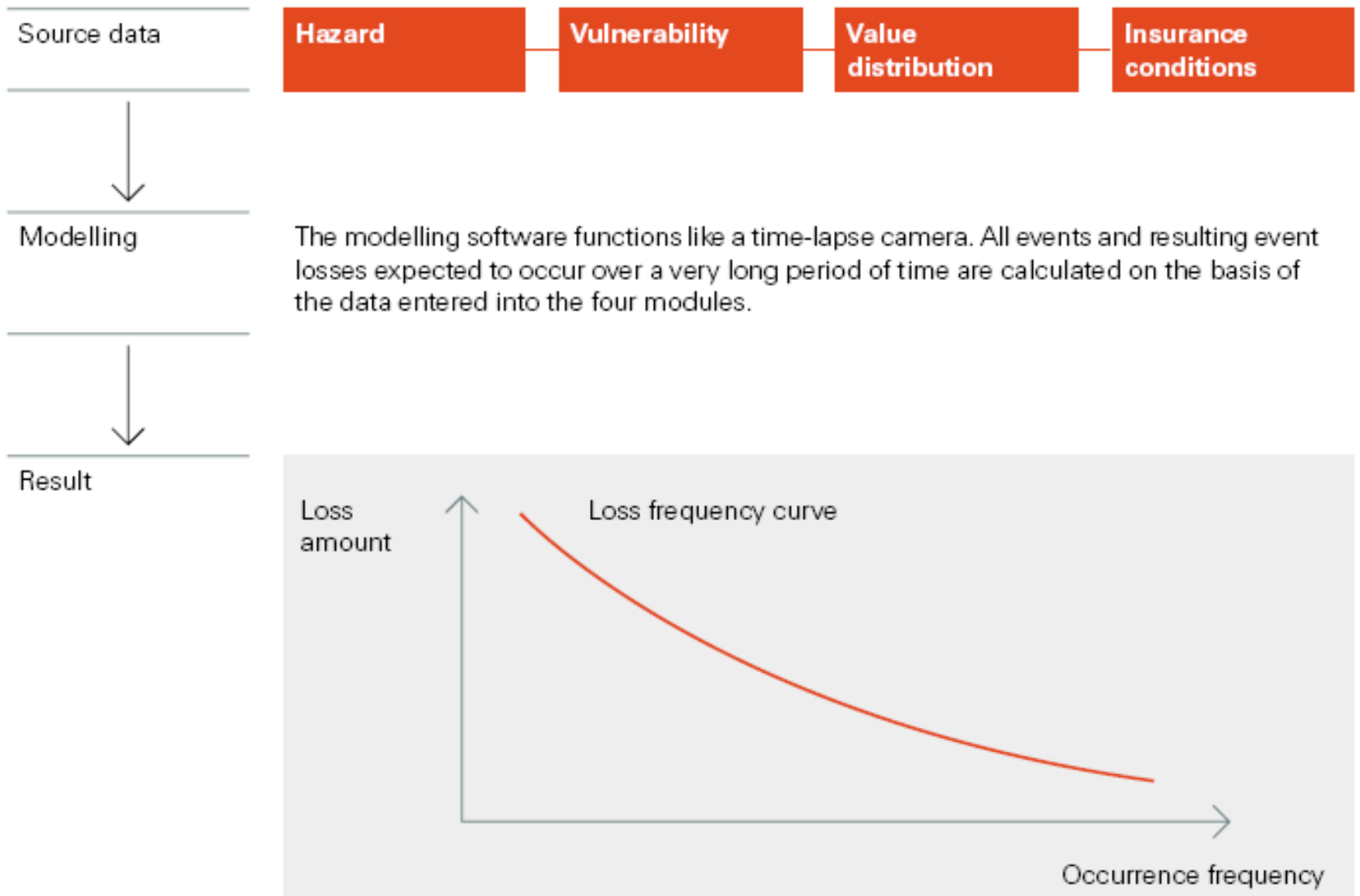
Scenarios:
possible (extreme) futures, good to stress test strategies
but no probability

Probabilistic modeling:
the full range, both in intensity and frequency dimension
good to truly assess strategies

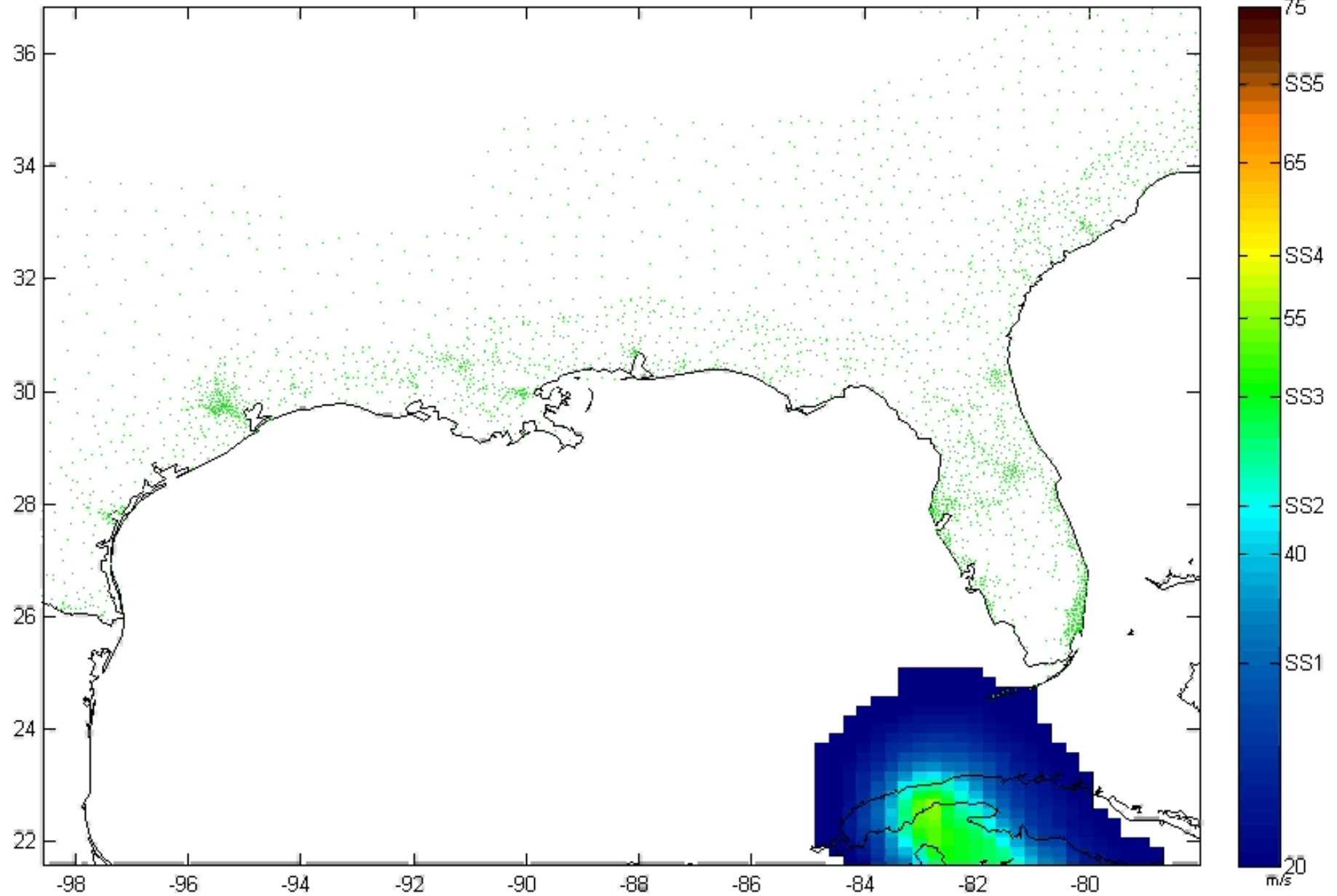




Nat Cat risk assessment: four modules





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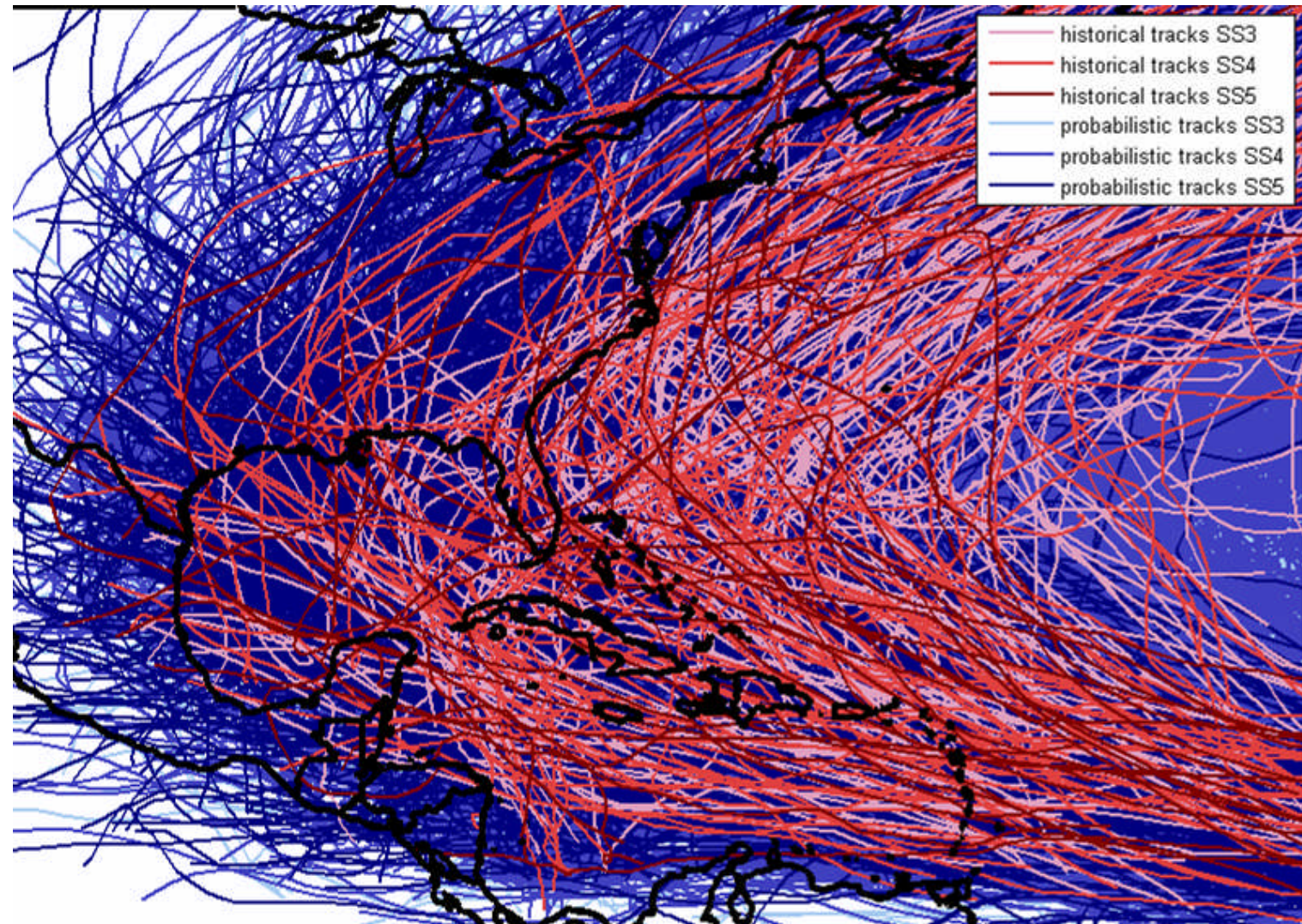


gust in color, portfolio green, loss blue - catMos - David N. Bresch



TC North Atlantic – historic → probabilistic

-  historic
~100 years
-  probabilistic
~10'000 years



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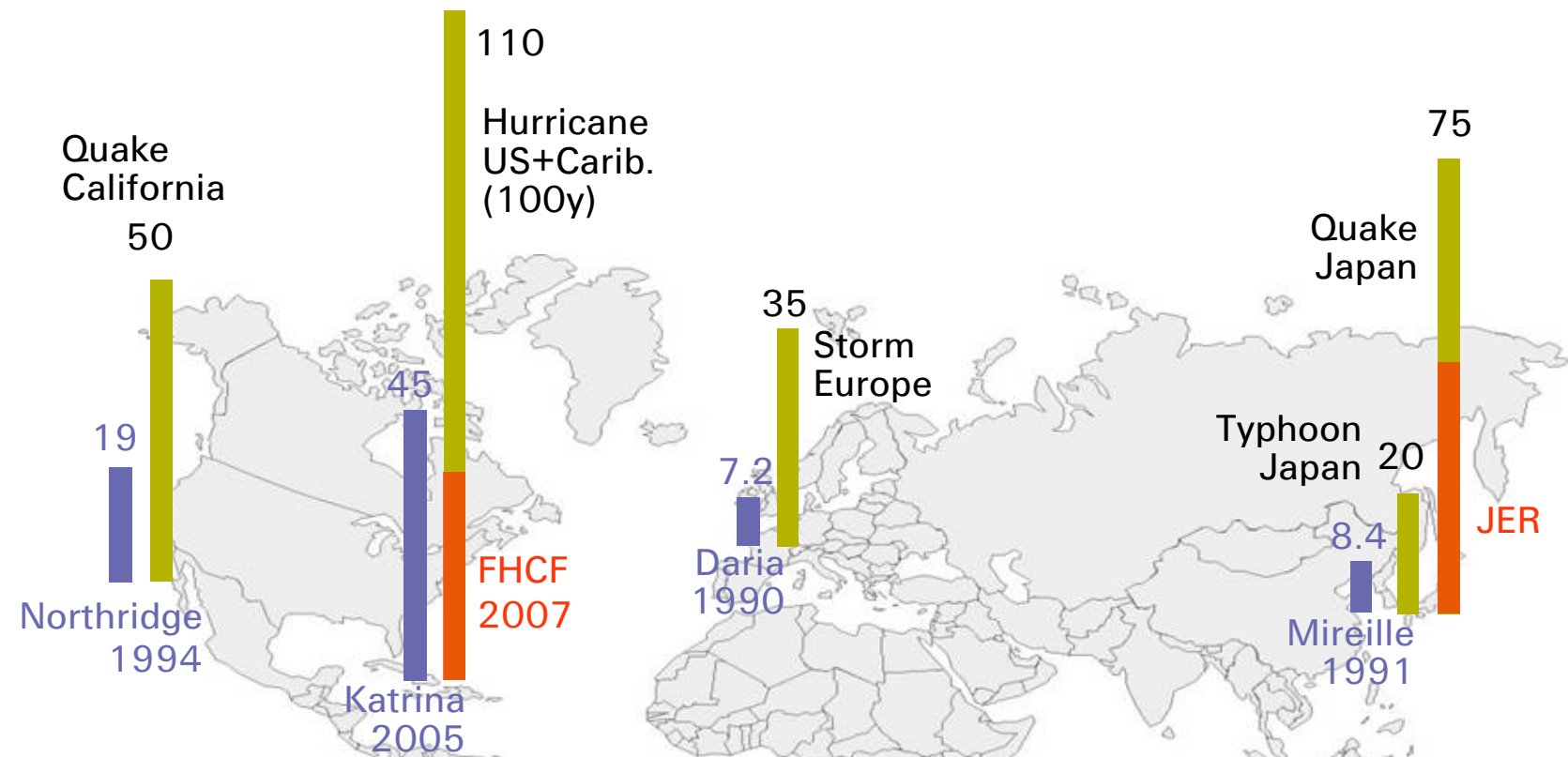
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The largest loss potentials

Peak risks:

- Earthquake or storm
- In industrialised countries
- With high insurance density



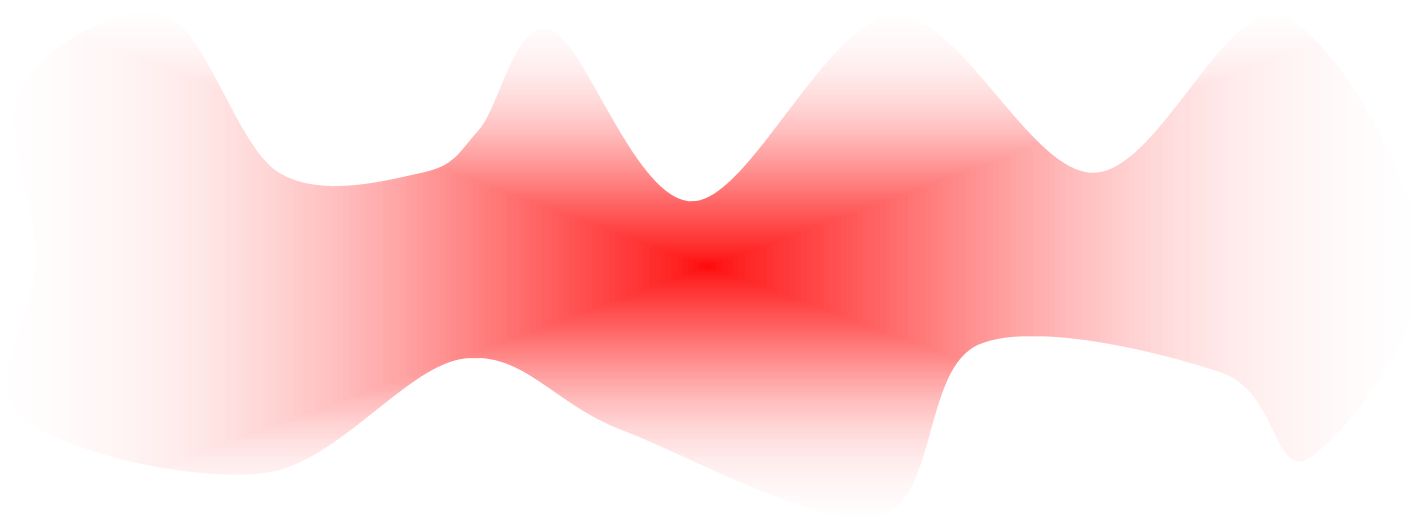
Insurance loss potentials in USD billions:

- Nat cat events (indexed to 2006, source: sigma 2007)
- Loss potentials from events with a return period of 200 years (100 years for Hurricane North Atlantic)
- FHCF: Florida Hurricane Catastrophe Fund } state-run schemes
- JER: Japan Earthquake Reinsurance Scheme }



Reality and Model

Reality



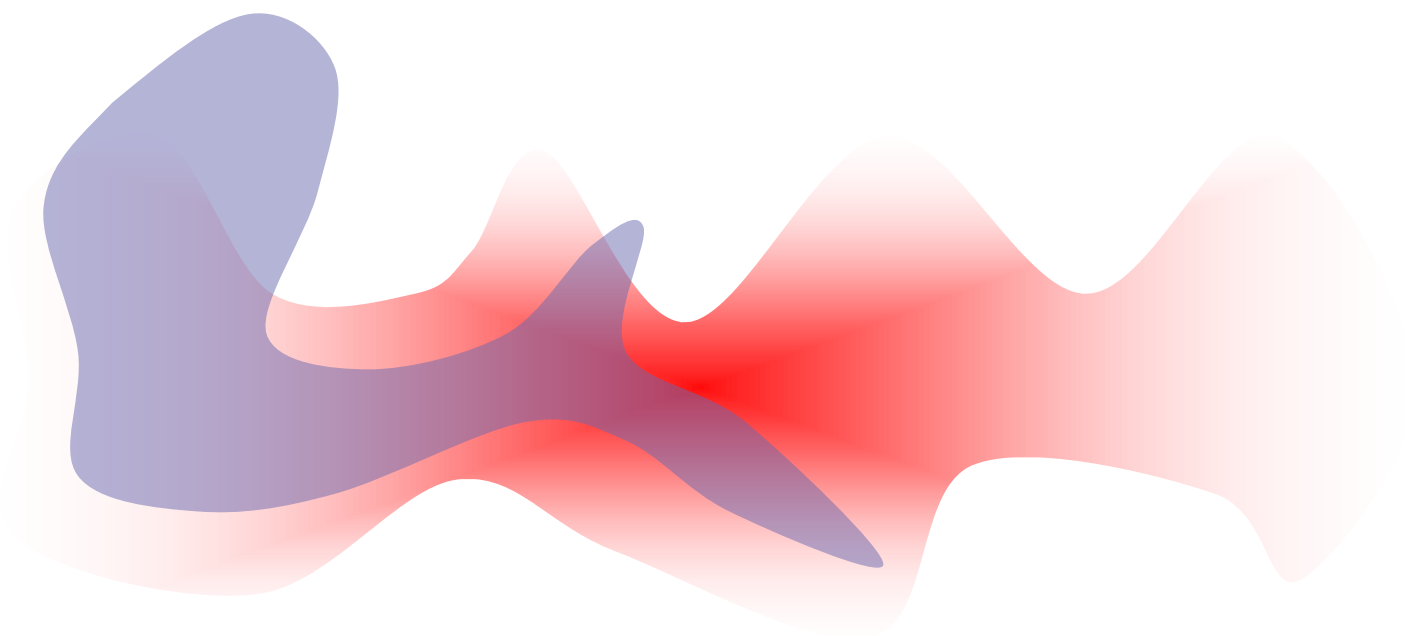
To be more precise: *Perceived reality*



Reality and Model

Reality

Model

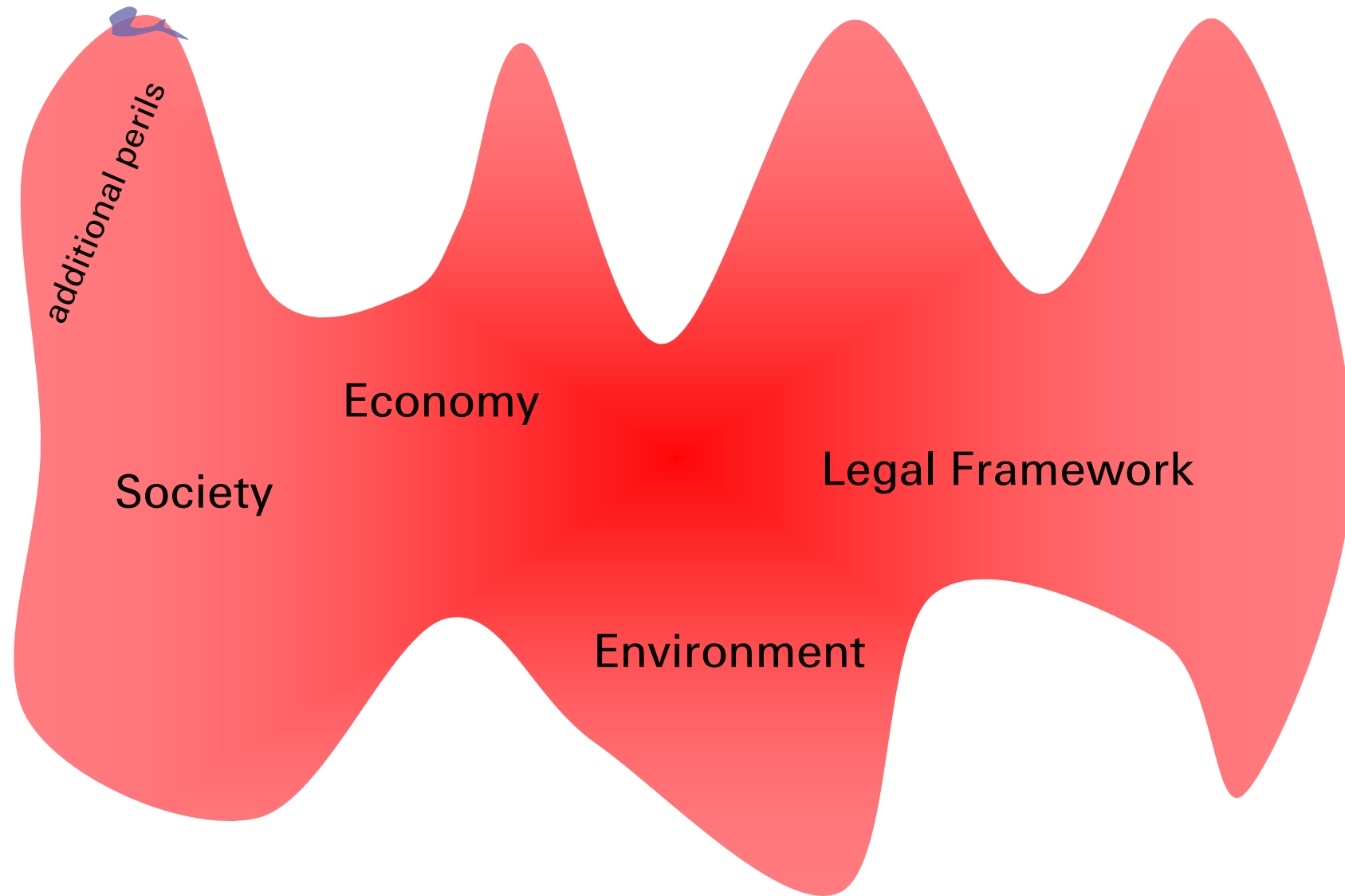




Reality and Model: Proportions

Reality

Model

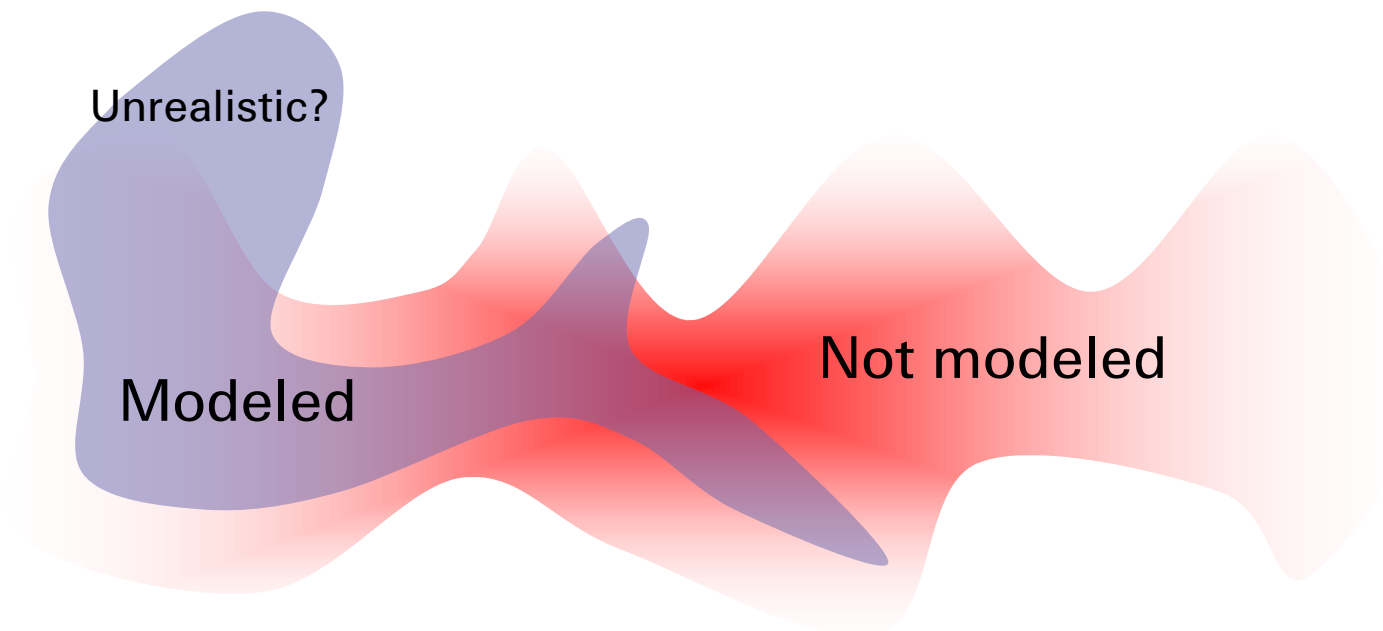




Reality and Model: What can be described

Reality

Model



Reality → Model: Abstraction

Described in Model

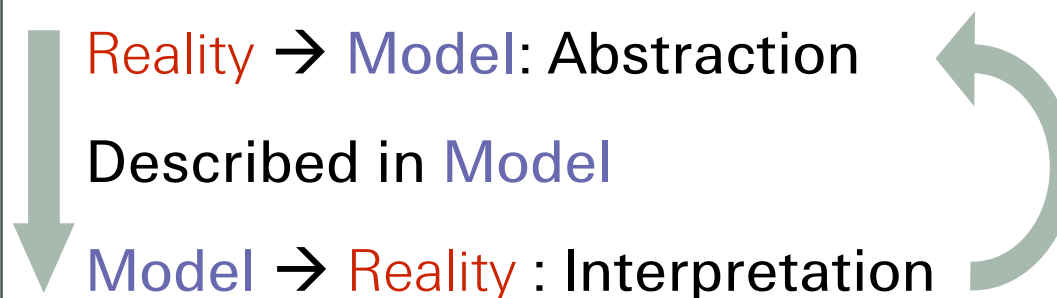
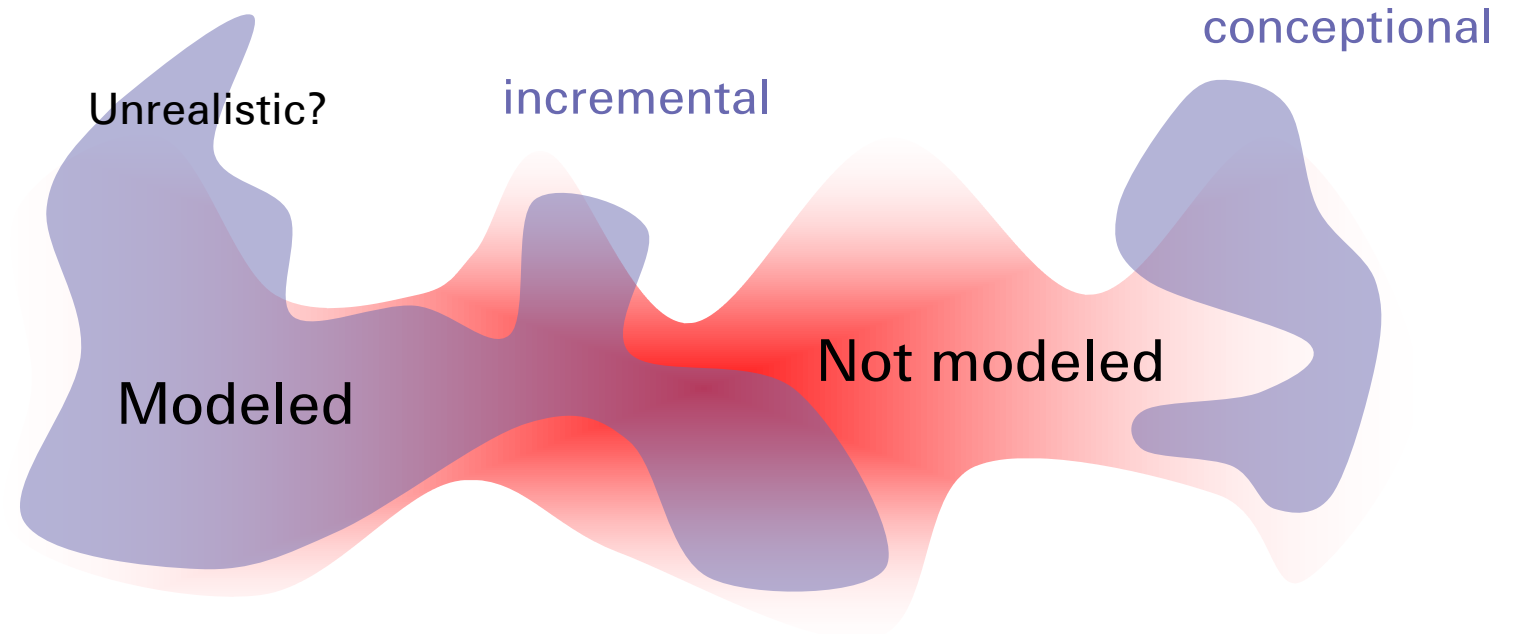
Model → Reality : Interpretation (*Verification/Falsification/Calibration*)



Reality and Model: Development

Reality

Model

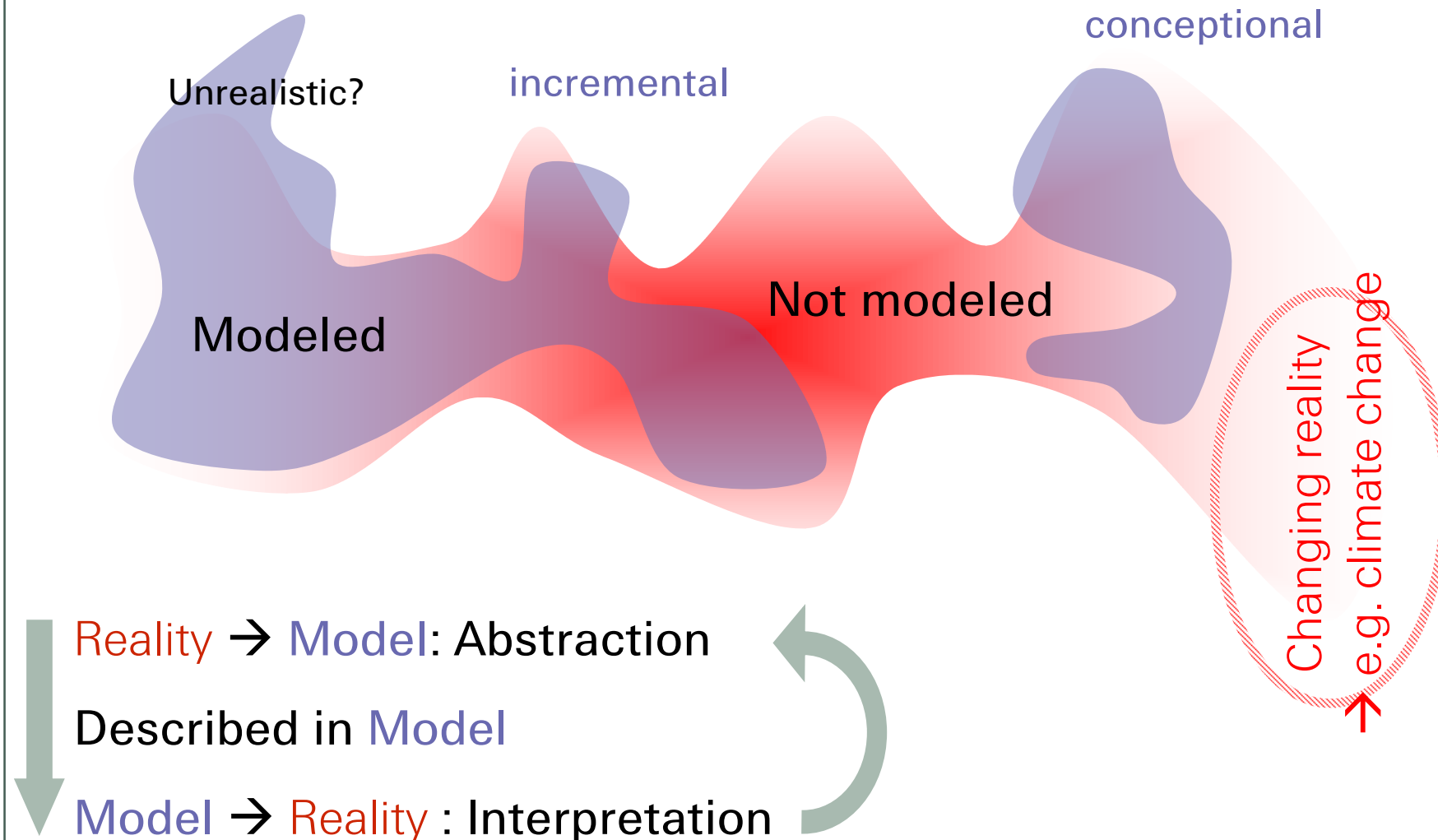




Reality and Model: Development

Reality

Model

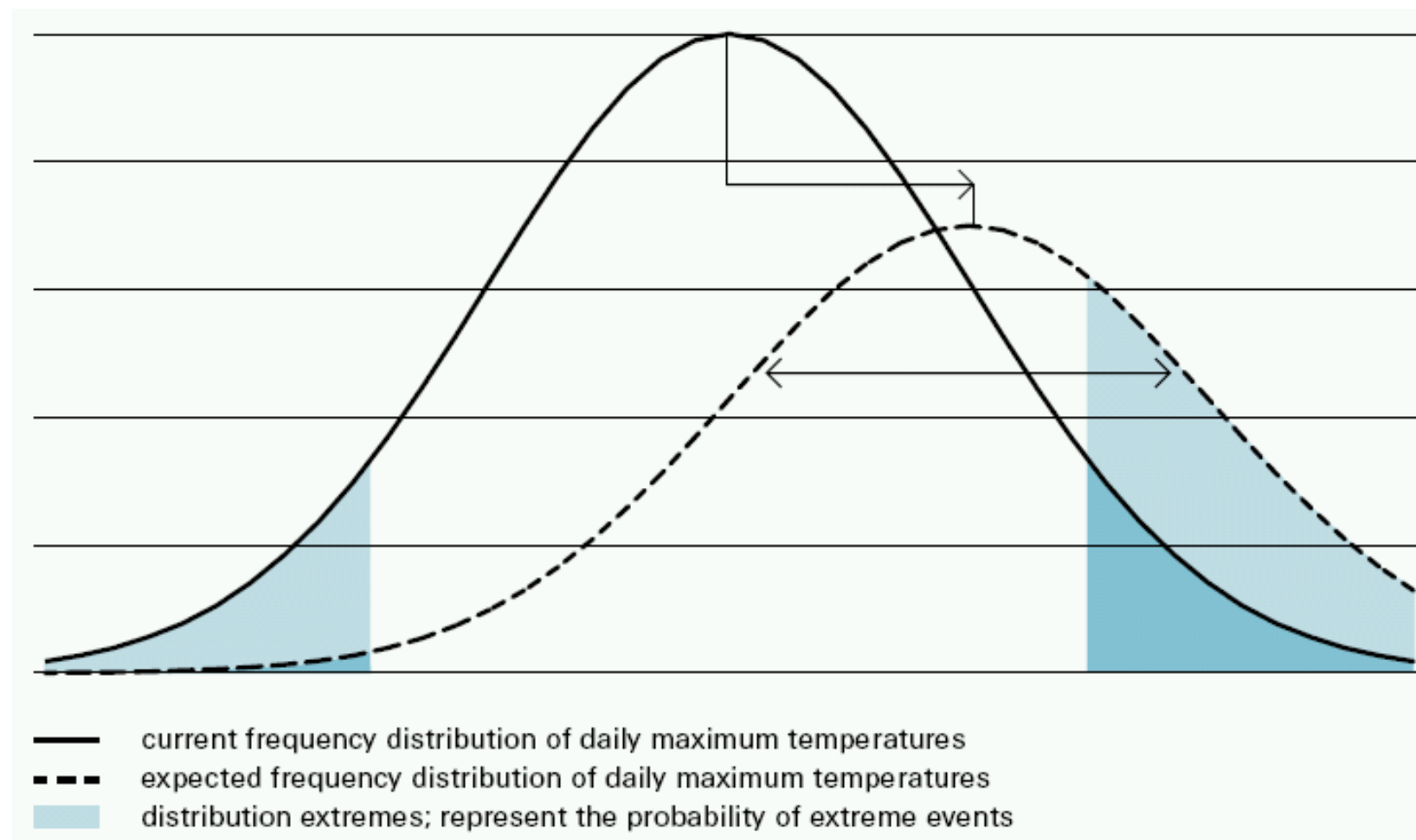


Be reminded: *Perceived reality*



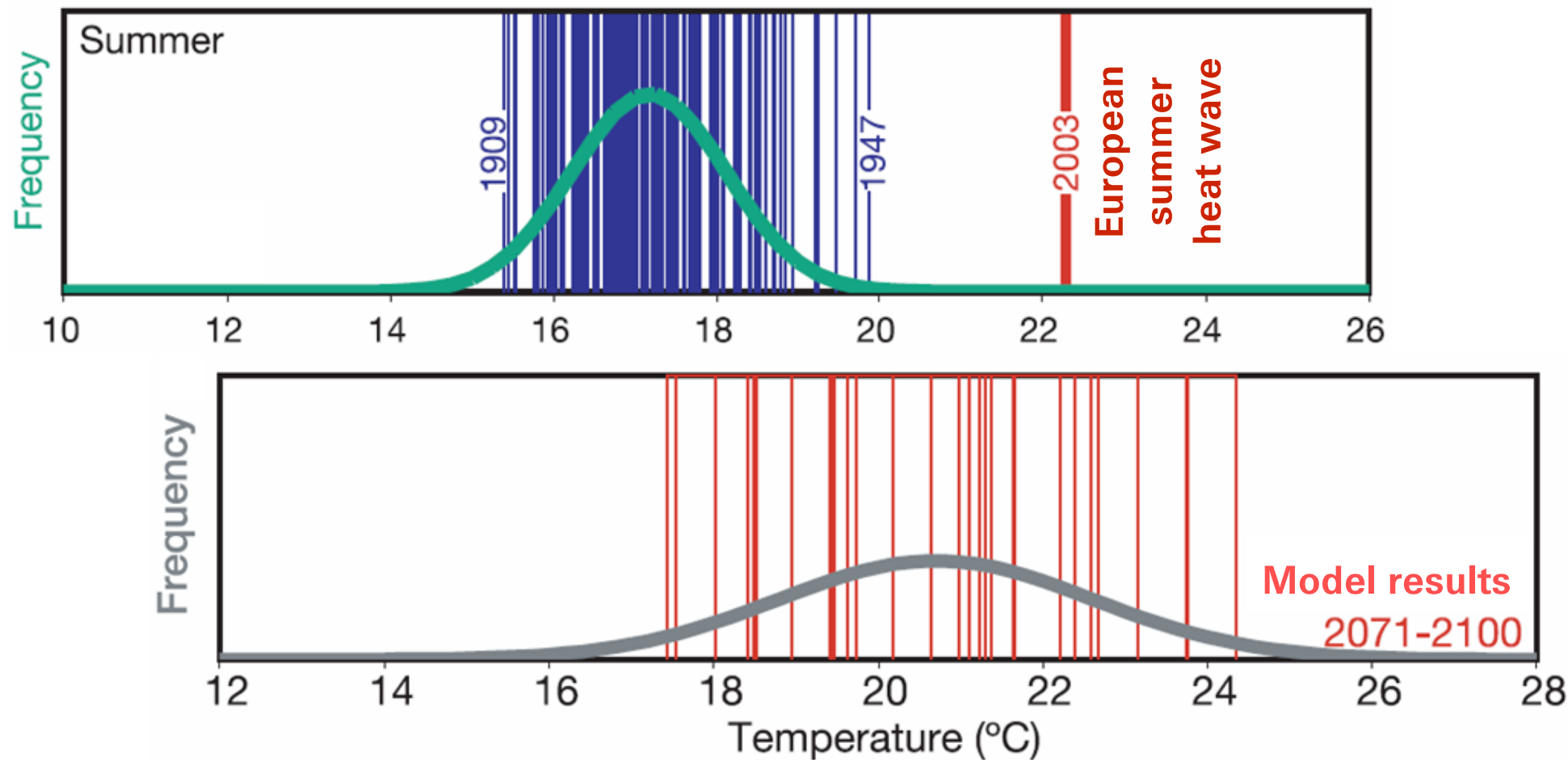
How will climate change impact the re/insurance industry?

Possible change in mean AND variance





The next 100 years: Increasing variability



What has been exceptional in 2003 might become usual by 2070

Natural catastrophes and reinsurance



Risk perception
Natural catastrophes