MANAGING EXTREMES

Willis Re

CASUALTY CATASTROPHE (CAT) MODELING

2014 CAS Reinsurance Seminar

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Neil Bodoff, FCAS

Executive Vice President, Willis Re

Agenda

- Casualty catastrophe (cat) modeling
  - What
  - Why
  - When
  - How

What

- What is casualty cat & what distinguishes it from non-cat to justify modeling it separately?

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Narrative

Statistics

What

- What is casualty cat & what distinguishes it from non-cat to justify modeling it separately?

Narrative	Statistics
Large $ loss	Bad fit to non-cat curve
Large # insureds	Need regime-switching
Headlines	Need bi-modal curve

Why

- Why is it important to model casualty cat?
  - Ability to model downside is valuable
  - Casualty cat drives downside

When

- Why **now** is it important to model casualty cat?
  - Need
  - Desire

When

- Why **now** is it important to model casualty cat?
  - Need
  - Insurers have
    - Larger balance sheets
    - Ability to hold more risk
    - Willingness to hold more risk

When

- Why **now** is it important to model casualty cat?
  - Desire
  - Insurers have ecosystem for property cat
    - Models & metrics
    - Underwriting & pricing
    - Portfolio optimization
    - Reinsurance
  - Insurers want similar ecosystem for casualty

How

- How to begin building a casualty cat model?
  - Mindset
  - Conceptual building blocks
  - Key outputs

Mindset

Mindset

John Tukey, Mathematician
1915 - 2000

Mindset

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1915 - 2000

"Far better an approximate answer to the right question, which is often vague, than an exact answer to the wrong question, which can always be made precise."

Mindset

Mindset

Are you uncomfortable?

Mindset

Are you uncomfortable?

Good, you're supposed to be uncomfortable

Conceptual building blocks

- Framework
- Software architecture
- Parameters

Framework

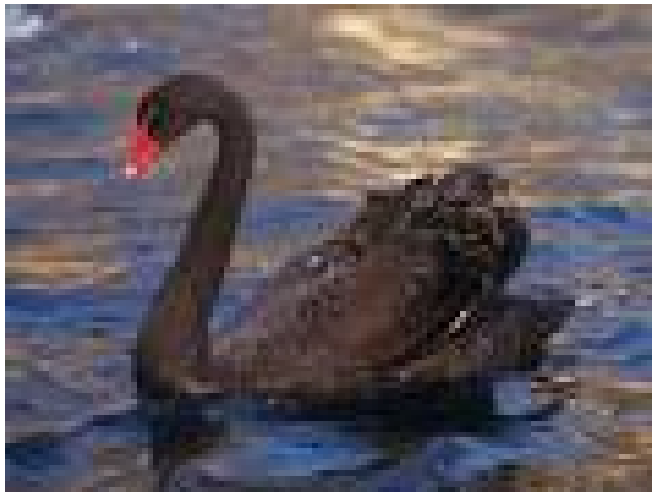
Scenario

- Start with historical events

Scenario

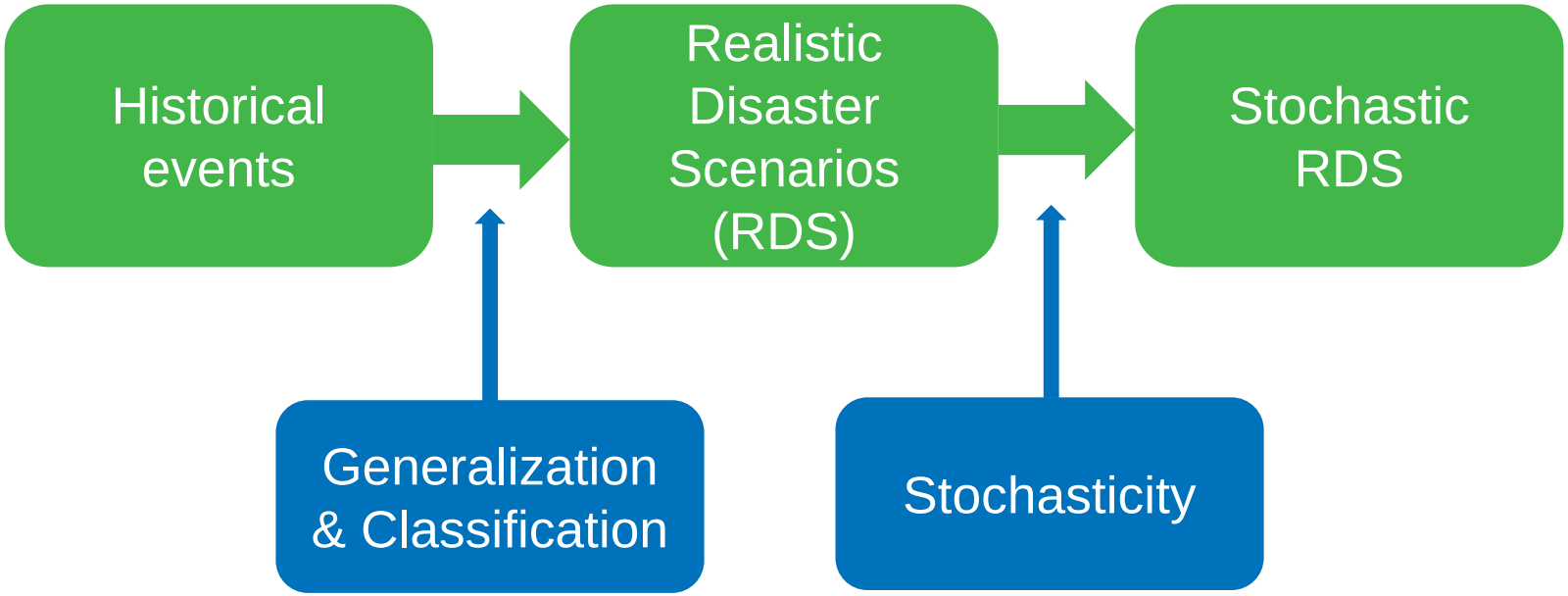
- Problem #1 with historical events:

- Problem #2 with historical events:



Scenario

- Solution



Scenario

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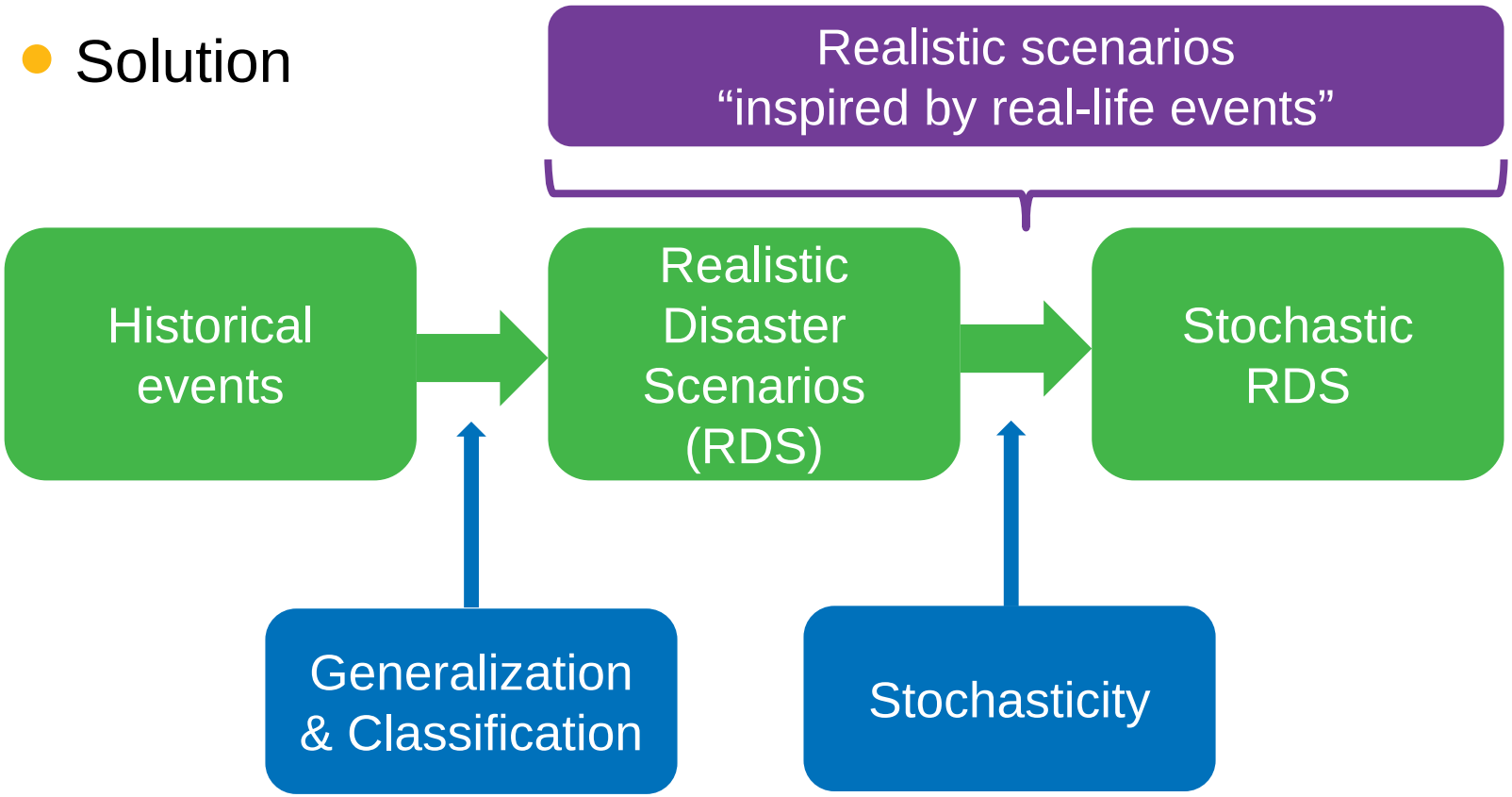
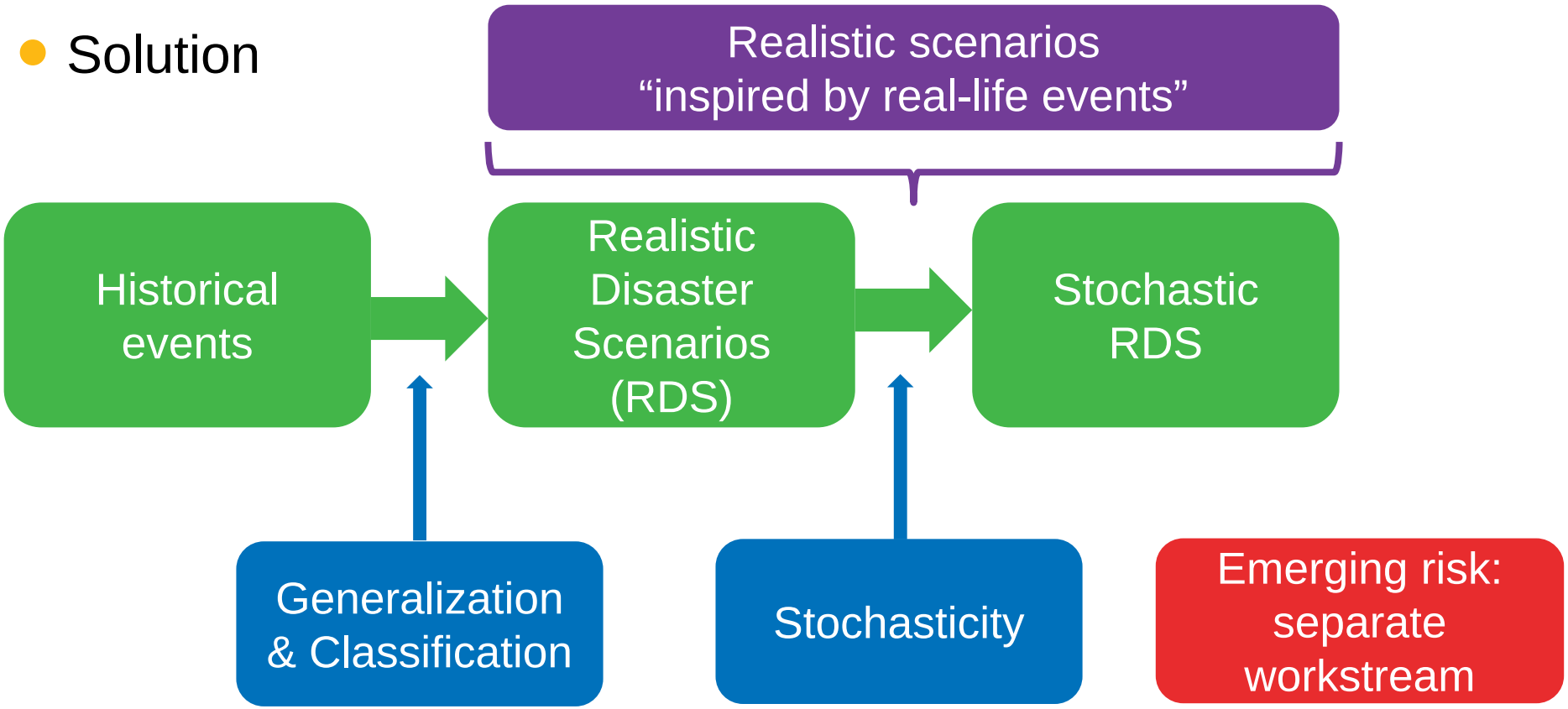


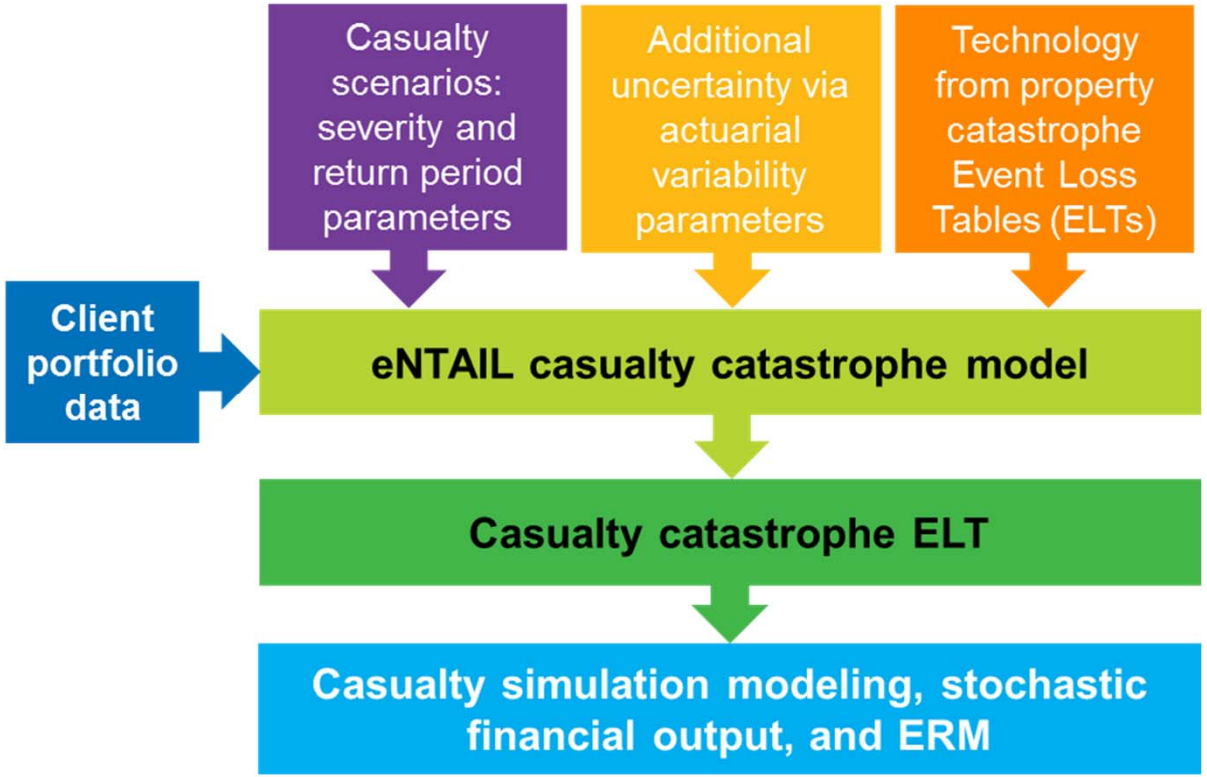
Scenario

- Solution



Software architecture

- eNTAIL™ casualty cat model by Willis Re
- Exposure-based framework: applies casualty scenarios to current in-force portfolio
- Output is an Event Loss Table (ELT)
- Stochastic simulation model



Conceptual building blocks

- Parameters

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- Parameters
  - Likelihood (frequency, return period, etc)
  - Impact (severity)
  - Variability

Conceptual building blocks

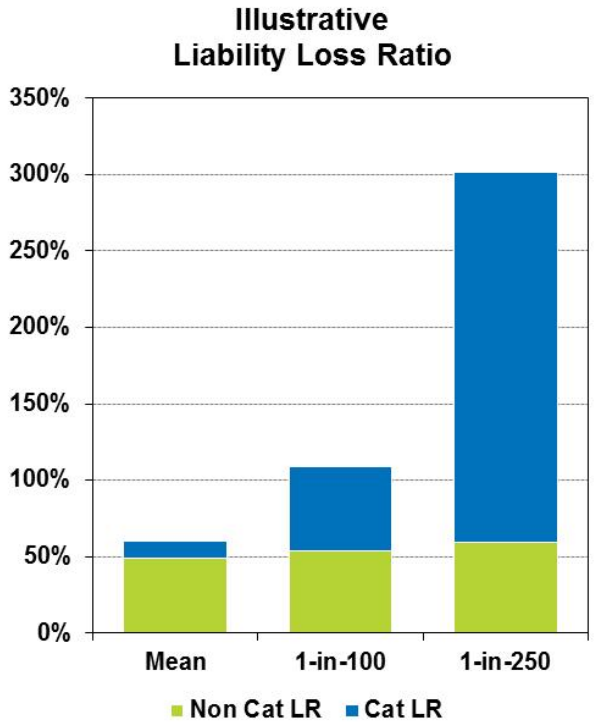
- Parameters
  - Likelihood (frequency, return period, etc)
  - Impact (severity)
  - Variability
    - Scenario heterogeneity
    - Parameter uncertainty
    - Pure randomness

Sample outputs

- Table of casualty cat return period losses for insurer's portfolio

Loss Summary	
Return Period (years)	**Cat Loss ($ billions)**
2	0.0
4	0.2
20	2.9
100	5.4
200	6.3
250	6.6
1,000	8.4

- Loss ratio downside via cat loss model and non-cat loss model



Conclusions

- Casualty cat modeling
  - New frontier
  - Insurers have both need and desire
  - Unlocks significant new value for insurers

Casualty cat modeling

Send comments to neil.bodoff@willis.com

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