CAS Simulator 2.0

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ReservePrism

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Agenda

- Background
- Structure
- Methodology
- Demo & QA

What is CAS Simulator 2.0?

- A tool to simulate individual claims
- Fitting, simulation and reporting
- Four claim classes:
  - ✓ Open claims (IBNER)
  - ✓ IBNR
  - ✓ Future claims (UPR)
  - ✓ Closed claim reopenings.
- R + EXCEL API
- Parallel Computing
- Open source

What is CAS Simulator 2.0?

Sponsored and managed by CAS Dynamic Risk Modeling Committee

Fernando Alberto Alvarado (Chair)

Steven L. Berman	Derek P. Cedar	Sara J. Hemmingson
Ziyi Jiao	Ronald S. Lettofsky	Daniel W. Lupton
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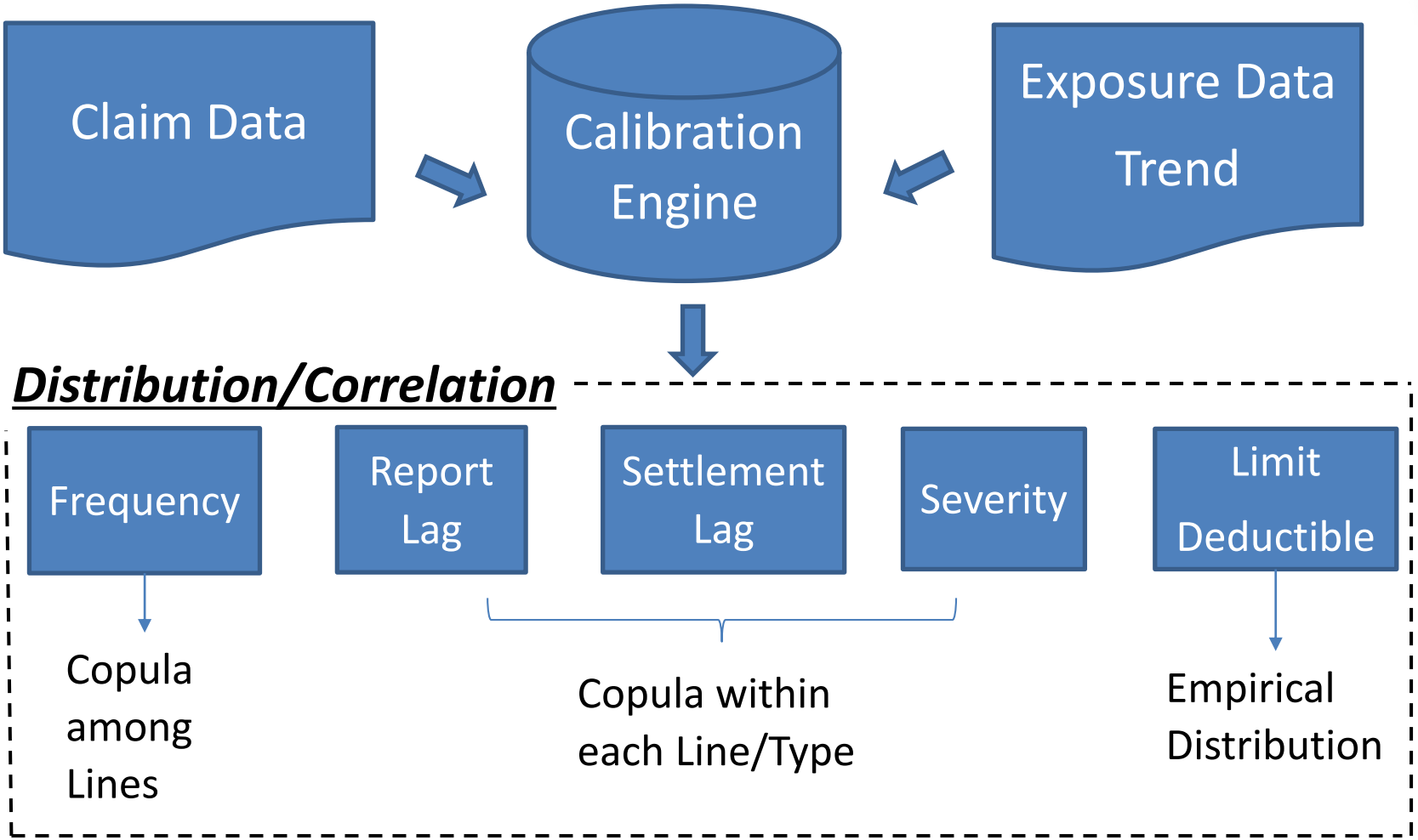
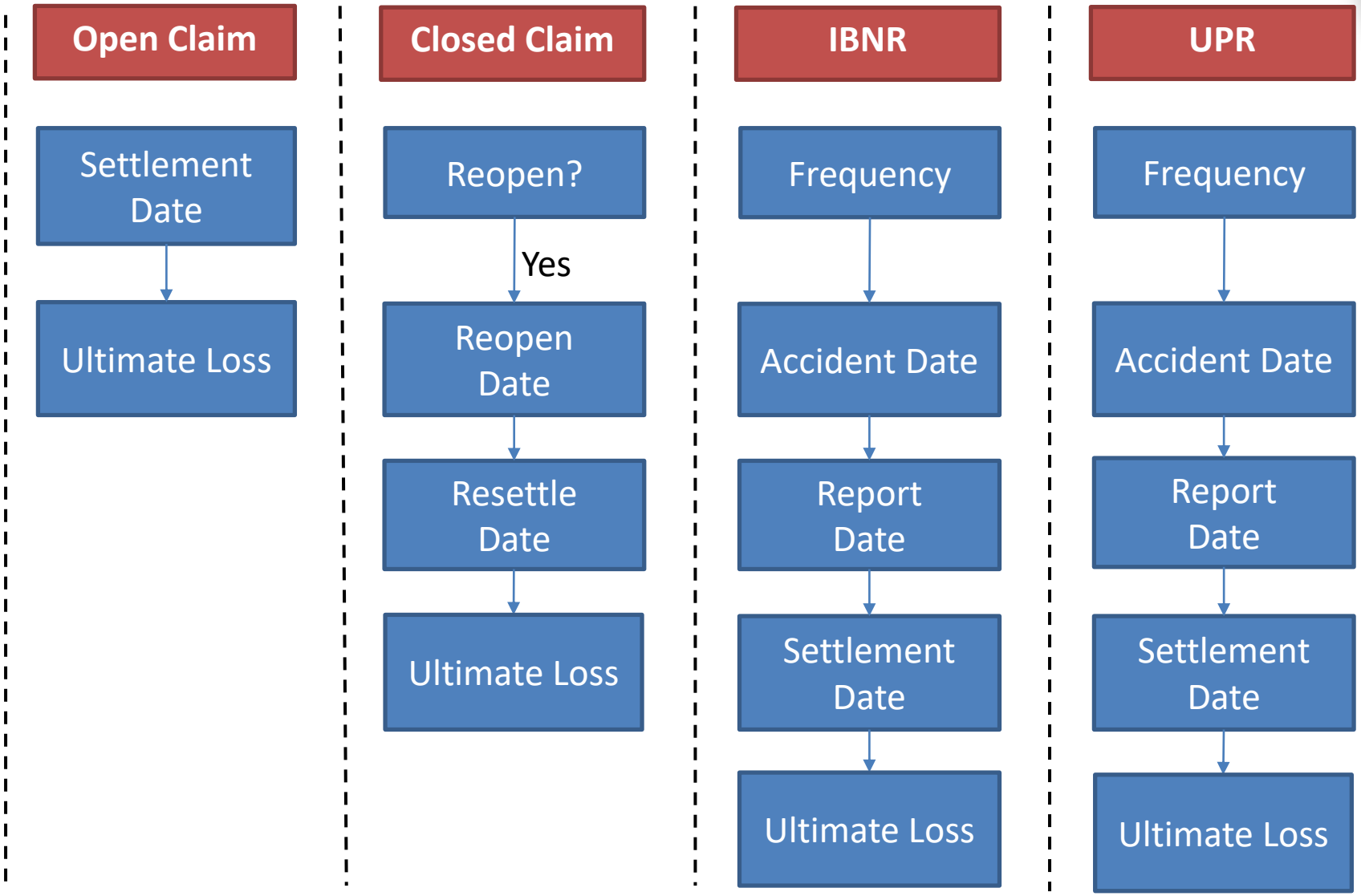
Daniel M. Van der Zee	Wei Xie	Kun Zhang

Built by ReservePrism

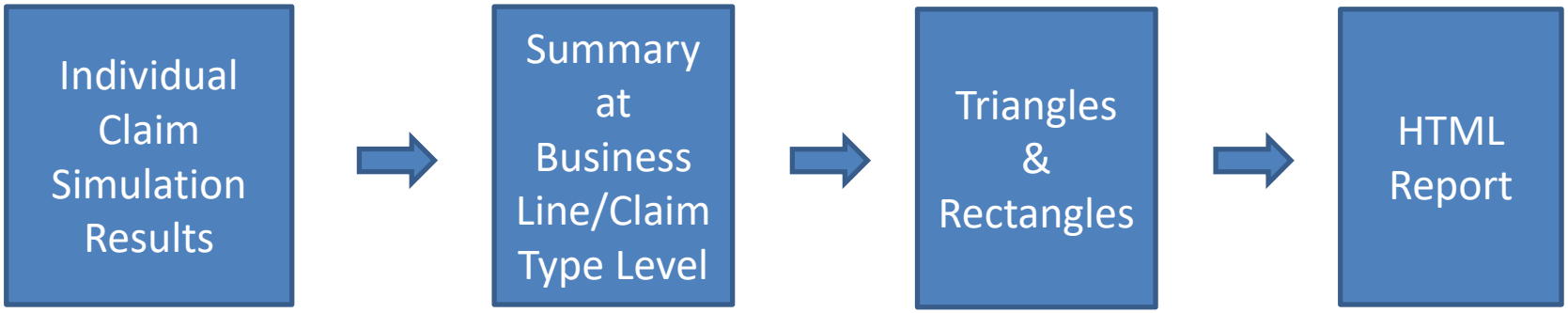
Robert Bear	Kailan Shang	Hai You


Claim Data
Calibration Engine
Exposure Data Trend
Distribution/Correlation
Frequency
Report Lag
Settlement Lag
Severity
Limit Deductible
Copula among Lines
Copula within each Line/Type
Empirical Distribution

Structure - Simulation



Structure - Reporting



Parodi, Pietro (2013). Triangle-free reserving : a non-traditional framework for estimating reserves and reserve uncertainty. http://www.actuaries.org.uk/documents/triangle-free-reserving-non-traditional-framework-estimating-reserves-and-reserve

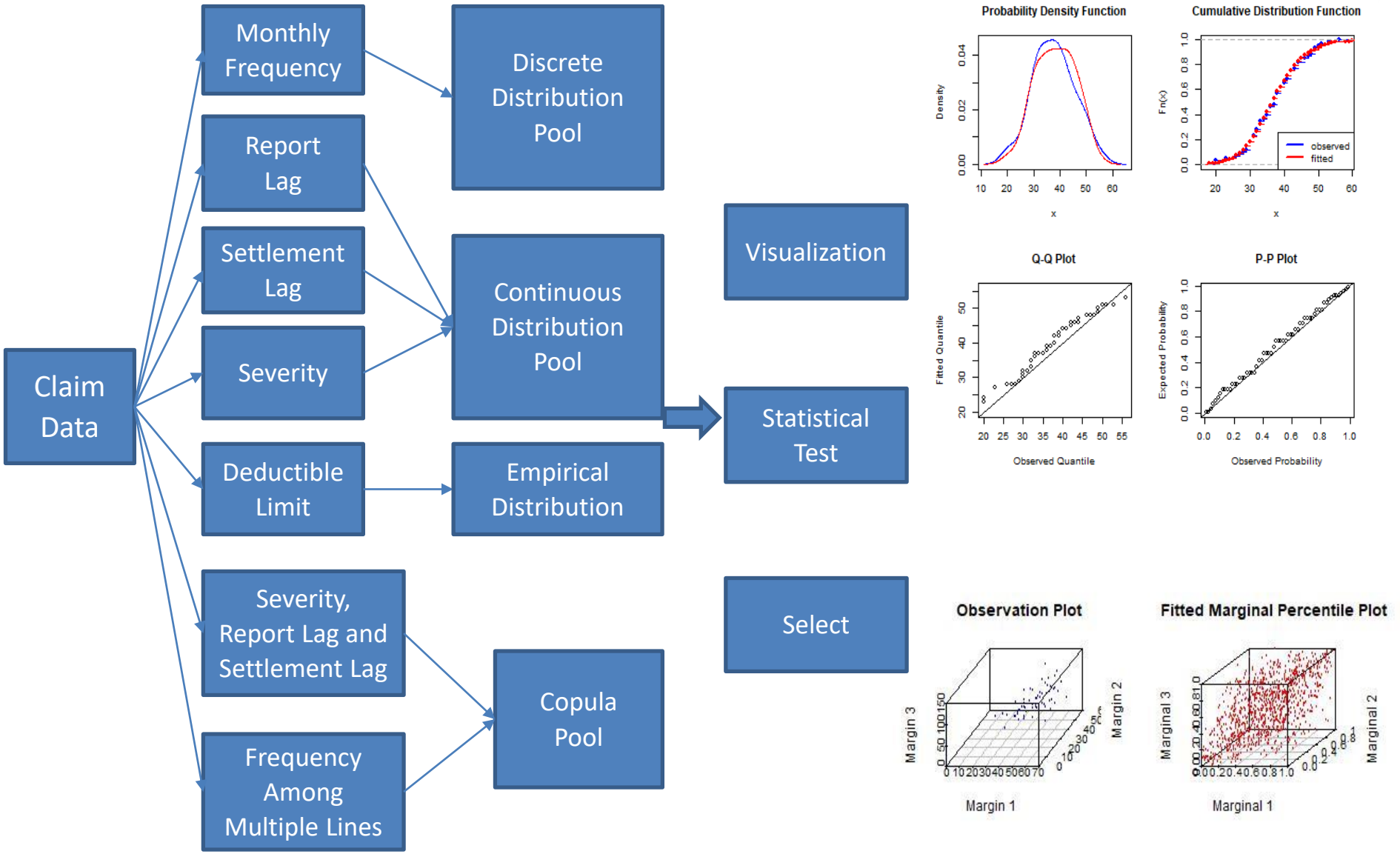
We enhanced it by adding the following:

- Advanced Claim Fitting
- Frequency copula
- Copula among severity, report lag and settlement lag
- Limit and deductible
- Probability of no claim by development year, P(0)
- Conditional loss distribution for open claim loss development
- Closed claim reopenings

Methodology Documentation:

http://www.reserveprism.com/Simulator2/doc/Simulator2Methodology.docx

Methodology - Fitting



Loss Development Options

1. Year-to-year development factors

$10{,}000 \times (1.15+0.043\times e_1) \times (1.1+0.088\times e_2)$

Current Development Year	Year-to-Year Development Factor	
	Mean	Standard Deviation
1	1.200	0.059
2	1.150	0.043
3	1.100	0.088
4	1.050	0.100
5	1	0

Available Distribution:

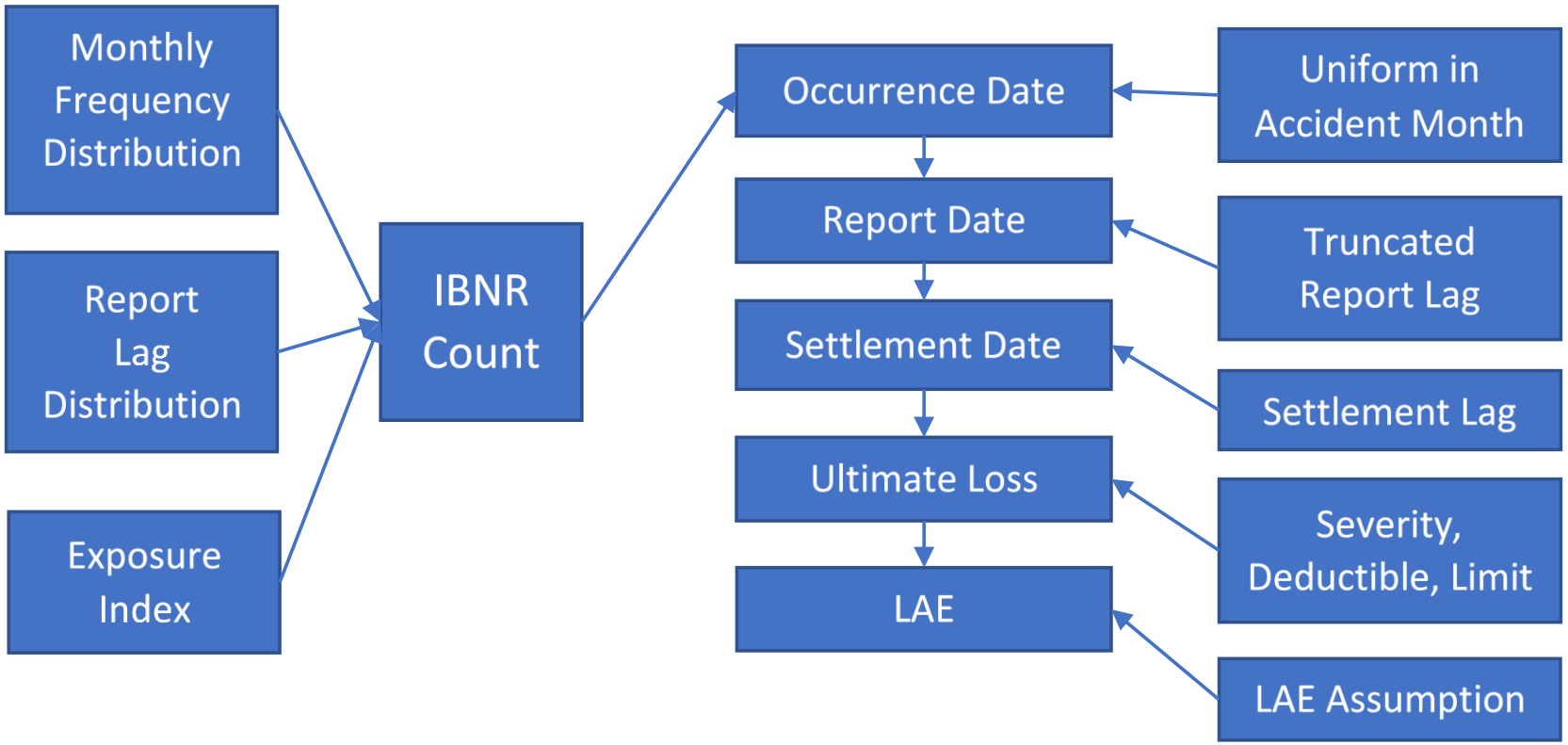
- Gaussian
- Lognormal
- Gamma

2. GLM

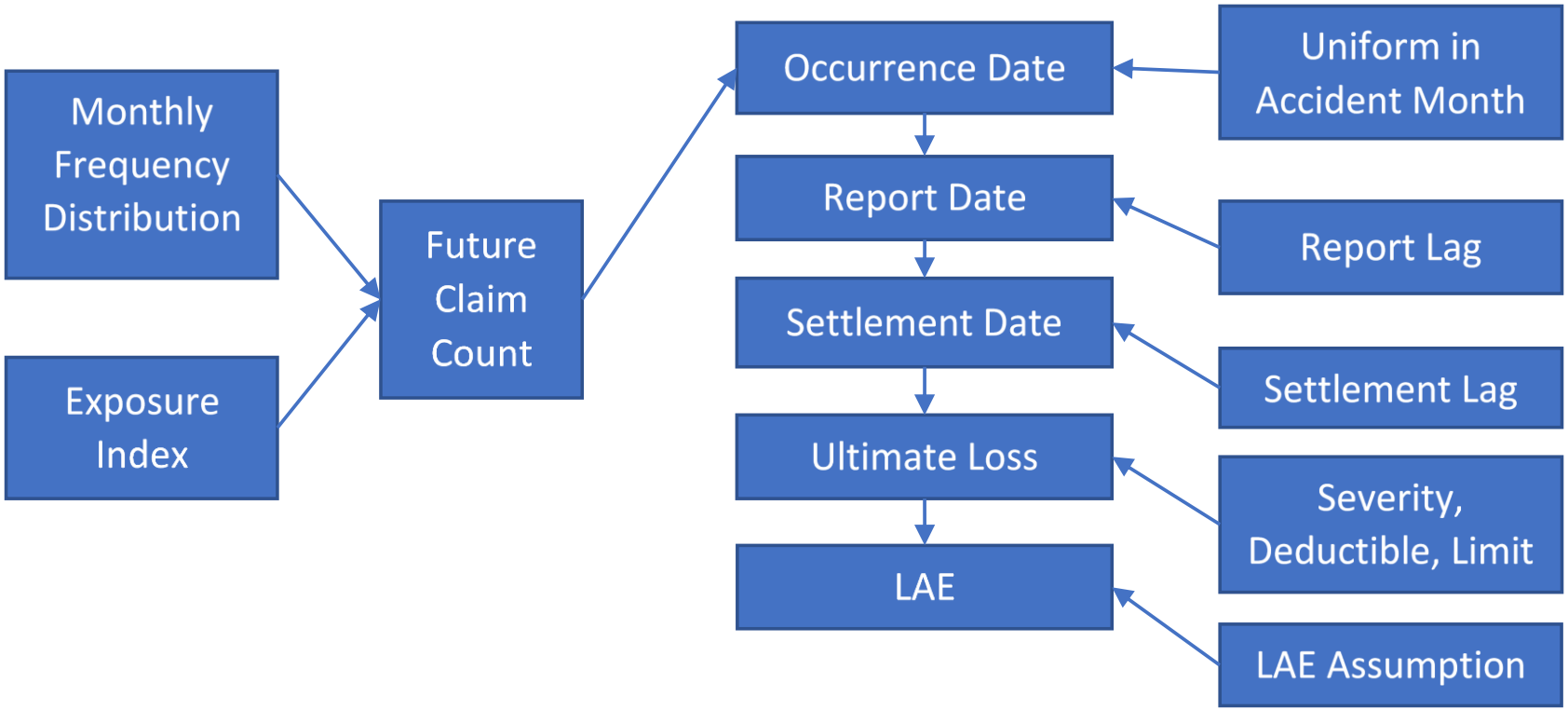
- identity(Linear Function): $Cumulative\ Development\ Factor = \alpha + \beta_1 d + \beta_2 l + \beta_3 os + \cdots + \epsilon$
- exponential(Loglinear Function): $Cumulative\ Development\ Factor = \log(\alpha + \beta_1 d + \beta_2 l + \beta_3 os + \cdots + \epsilon)$
- log(Exponential Function): $Cumulative\ Development\ Factor = e^{\alpha+\beta_1 d+\beta_2 l+\beta_3 os+\cdots+\epsilon}$
- inverse(Reciprocal Linear Function): $Cumulative\ Development\ Factor = \frac{1}{\alpha+\beta_1 d+\beta_2 l+\beta_3 os+\cdots+\epsilon}$

3. Conditional loss distribution based on paid loss or incurred loss

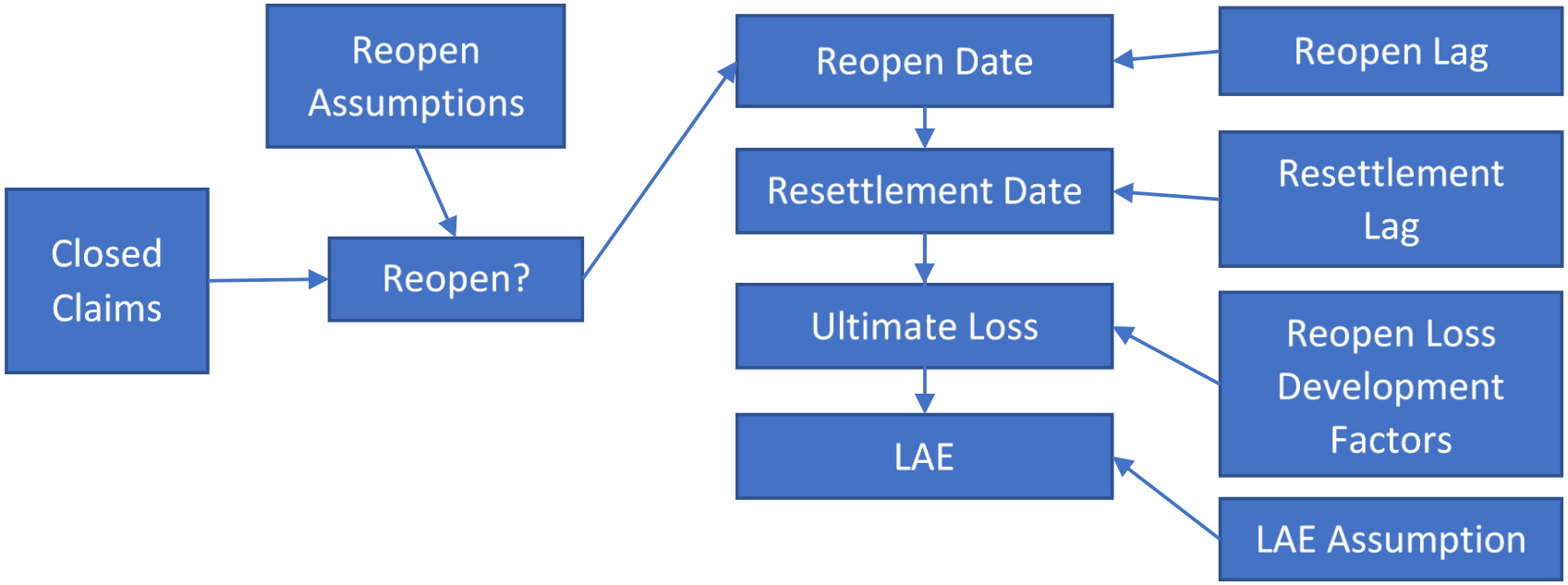
Methodology – IBNR Simulation



Methodology – UPR Simulation



Methodology – Claim Reopen Simulation

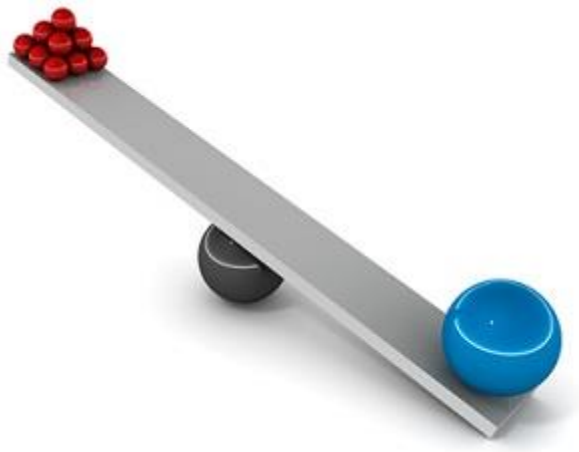


Demo

API: http://www.reserveprism.com/Simulator2/cascsim.xlsm

Other materials @ http://www.reserveprism.com/Simulator2

Q&A



ReservePrism is an advanced enterprise actuarial loss reserving, pricing and predictive modeling platform.

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