Actuarial Approaches to Measuring and Managing Non-Traditional Risks

James Ely

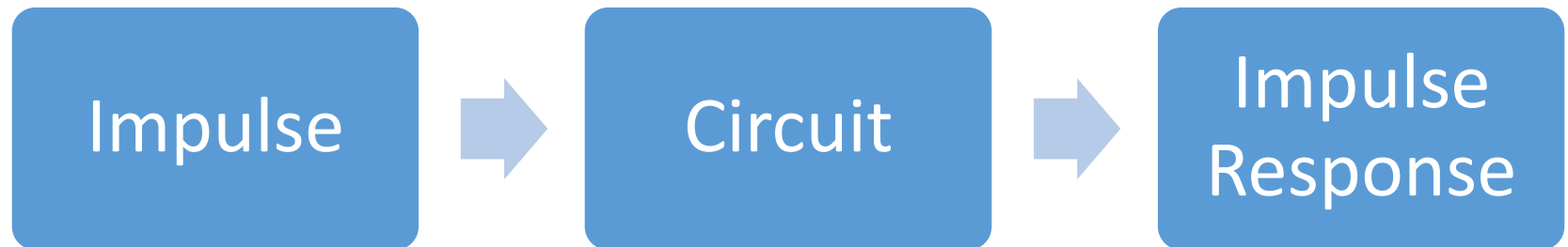2019 CAS Annual Meeting

Discrete-Time Signal Processing (DSP)

DSP methods are used in the processing of signals in electronic communications as well as in the testing of electronic circuits.

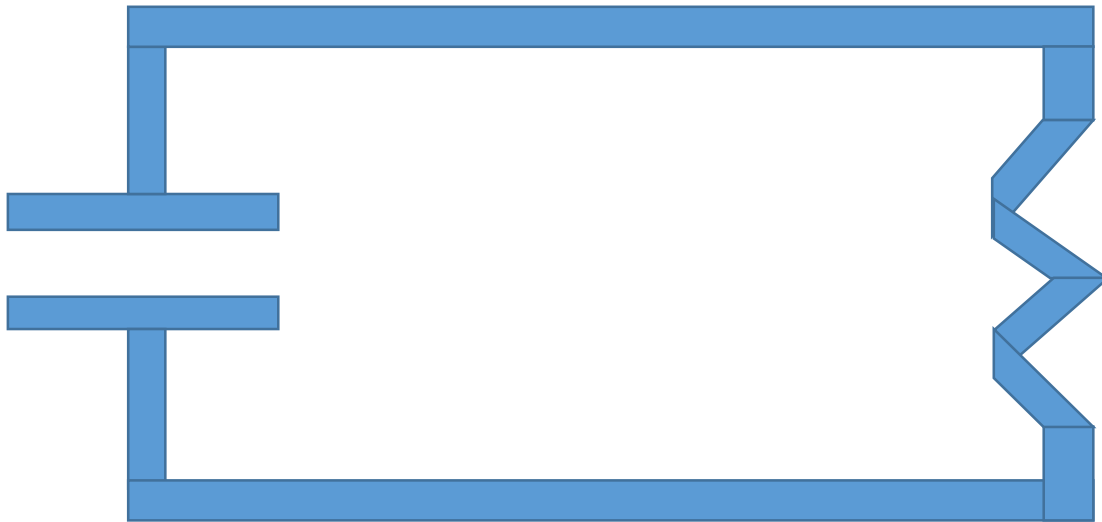The basic formulation of the problem has three components:

1. A linear system to be tested
2. An impulse is applied to the system
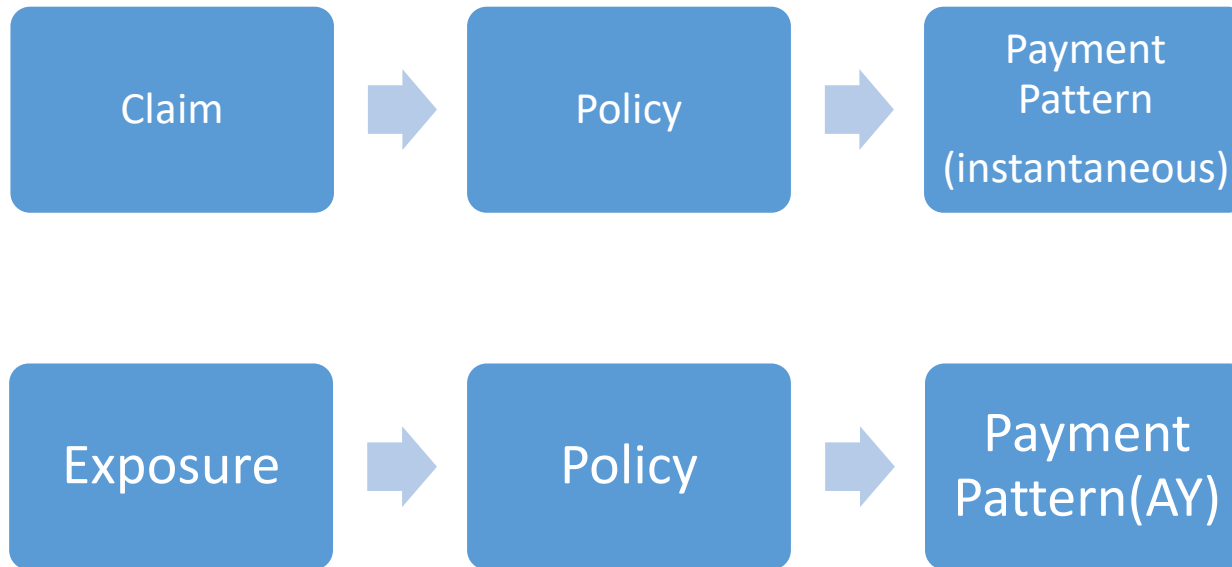3. The response of the system is recorded
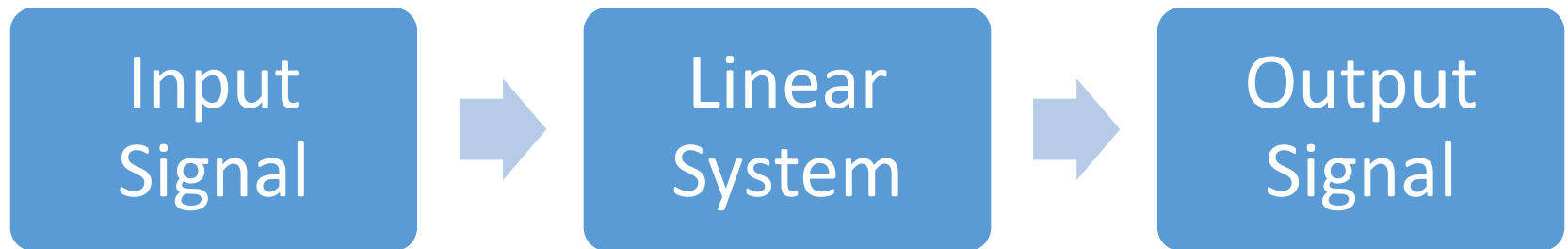
Impulse Response of a Circuit

Impulse → Circuit → Impulse Response

A Simple Circuit

Insurance Analogies

Claim	→	Policy	→	Payment Pattern (instantaneous)

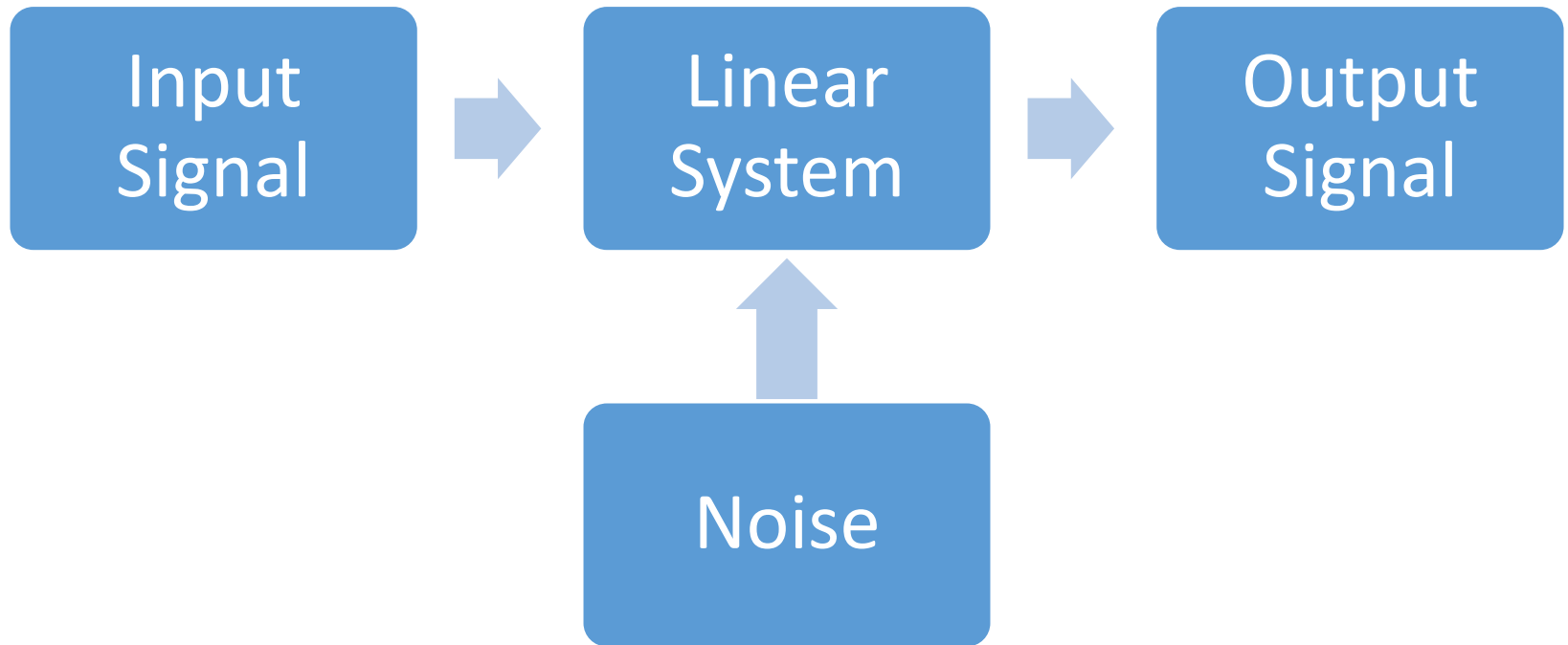| Exposure	→	Policy	→	Payment Pattern(AY)

Noiseless System

Output Signal of a Noiseless System

$$Output\ Signal = Input\ Signal * Impulse\ Response$$

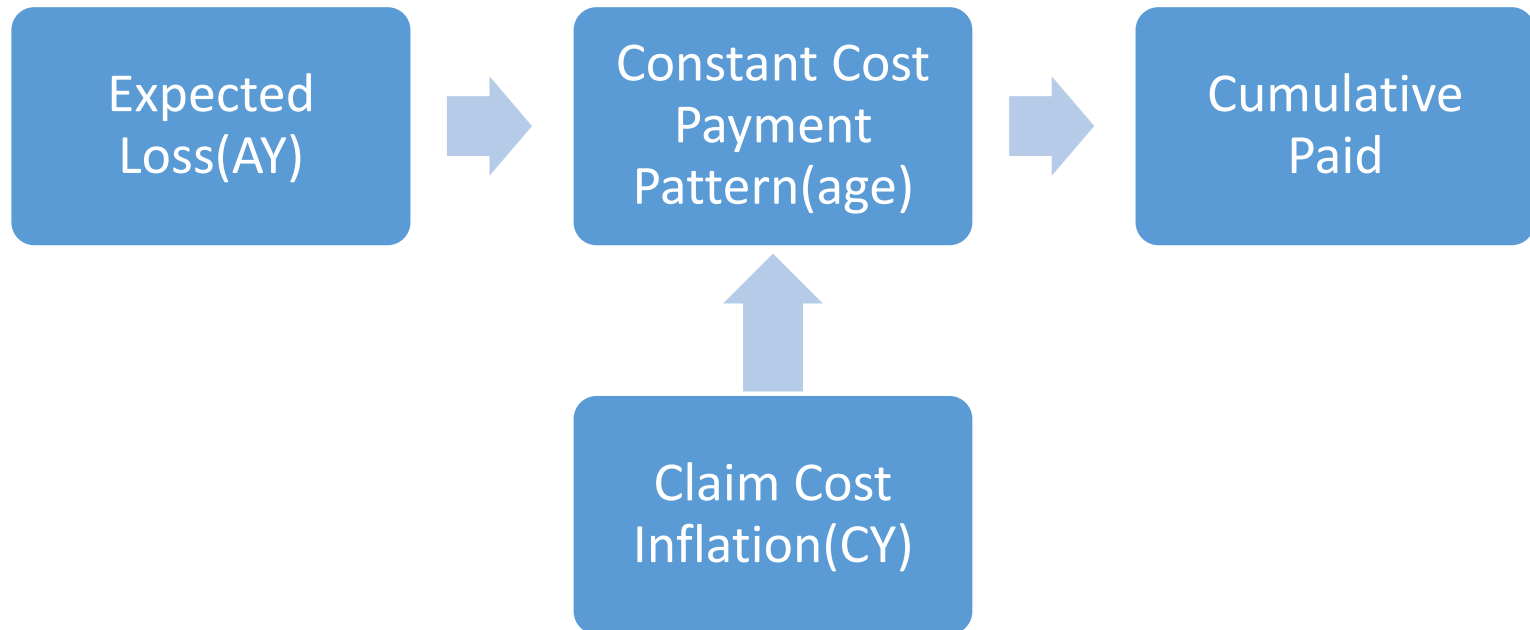$$Paid(CY) = \sum_{AY=0}^{CY} Expected\ Loss(AY) * \%Paid(CY - AY)$$
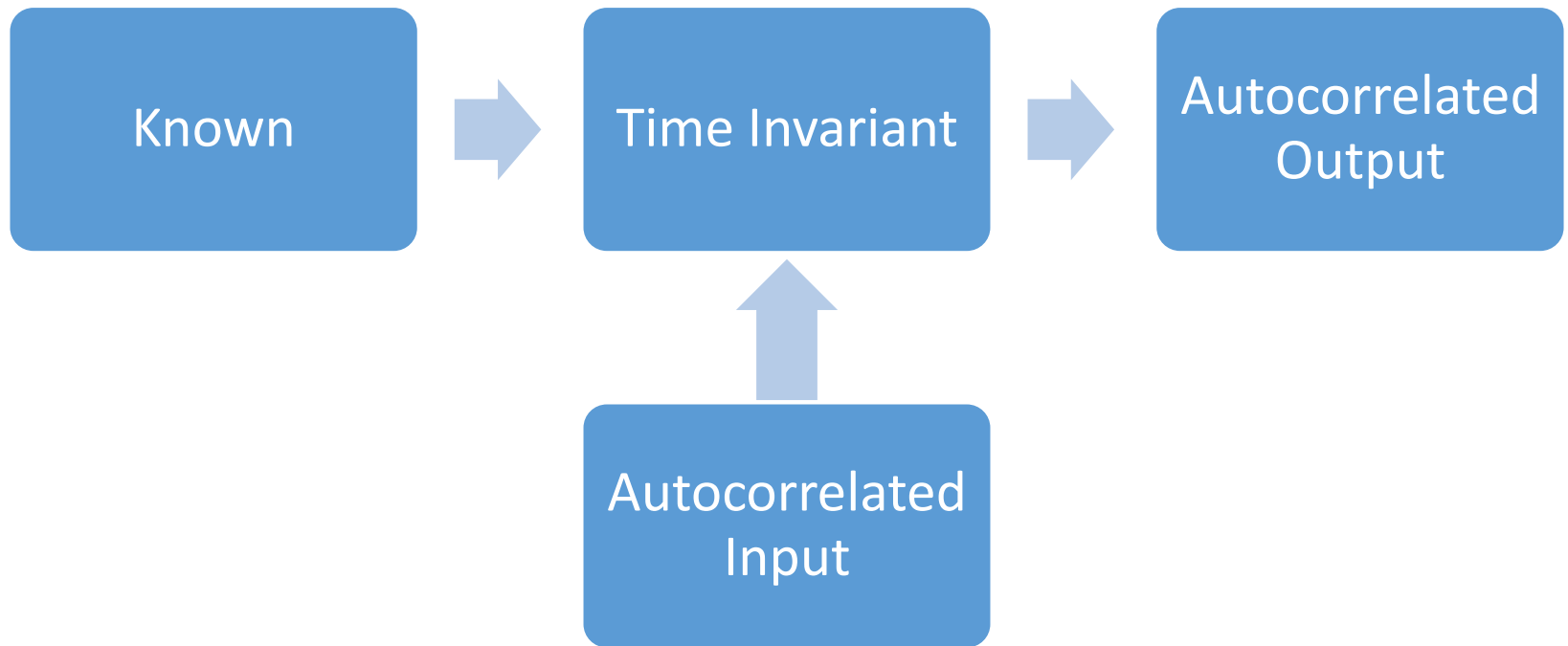
System with Noise

Variability of CY Trend is Analogous to the Noise Component

Expected Loss(AY) → Constant Cost Payment Pattern(age) → Cumulative Paid

Claim Cost Inflation(CY) ↑

Time Series Analysis

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