



The Actuarial Profession

making financial sense of the future

UK Flood and Storm Catastrophe Modelling

David Sanders – Milliman

Agenda

- Introduction to the model – David Sanders
- Description of the Process – Neil Fleming
- Conclusions, Discussion and Questions

Introduction

What we are going to describe is not just a Cat model

It is not a stand alone model which is an add on to the business

It is a model which is integrated with the risk management and underwriting process of the business

It is therefore not like other cat models

How does it differ

Cat models tend to have the following processes

- The **Stochastic Module** which is used to randomly generate the catastrophic events.
- The **Hazard Module** which is used to determine the geographical effect of a catastrophic event brought about by variations in topography. E.g. regional flood depths, lower wind speeds in sheltered areas etc.
- The **Vulnerability Module** which is used to calculate damage to buildings, contents and business turnover based on a number of factors including, for example:
 - Building Type: Residential, Commercial or Agricultural,
 - Building Design and Construction Quality,
 - Building Height/number of floors,
 - Occupancy Type, and so on.
- The **Financial Module** which quantifies the financial loss to the insurer.

The Components of the new Model

- Location
- Aggregation
- Scenario
- Portfolio

We will deal with these elements within the presentation

Location

Post code is no good as it is

- Not unique
- May not exist
- May give wrong location
- May be coded incorrectly
- Changes
- Close post codes does not imply close locality

Post code – My home

- BBC weather codes think I live in Sharpness – a flood area 20 miles away
- Sat nav thinks I live 2 miles away in a valley
- I live nearly 1,000 feet up. So flood is unlikely!
- The local authority has a different post code for the property on the electoral register
- The post still gets delivered!

How do you solve this Post Code issue

- Geographic location using spatial coordinates
- Now have topographic details
- Can assess for flood
- Can now aggregate risks in zones
- Can use Flood boundaries (1 in 100 years) but
- No 1 in 100 year storm boundary !







GETTY IMAGES





Imagery Date: Apr 30, 2007

© 2009 Tele Atlas
© 2009 Infoterra Ltd & Bluesky
51°59'29.14" N 2°09'25.65" W elev 14 m

© 2008 Google
Eye alt 704 m



vision
of the future

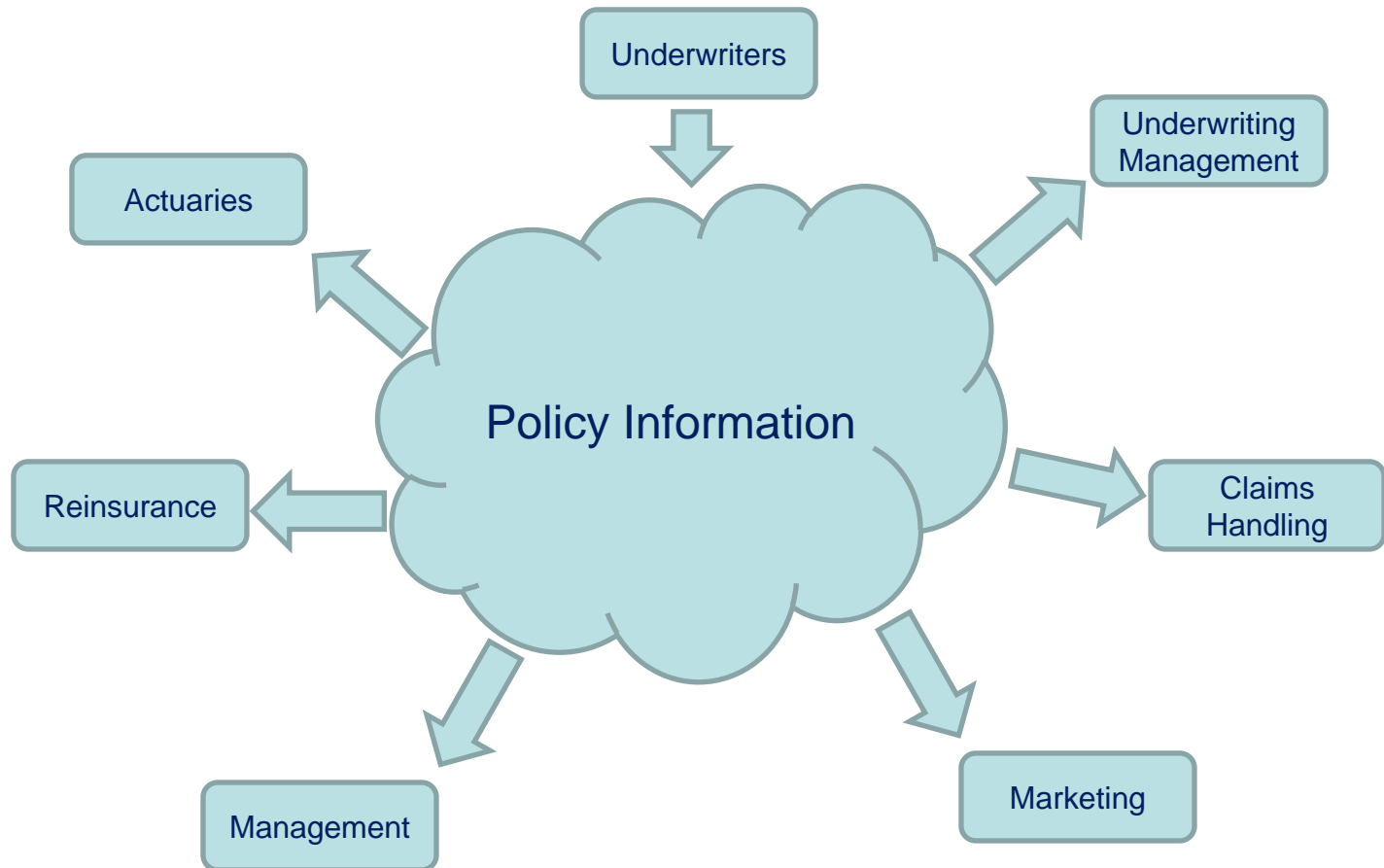


vision
of the future

System Principles

- Single data repository
- Unified View of Risk
- Portfolio specific risk profiles

System Principles



Information Held

- Who – the policy holder is (not of interest to us)
- Where – the property is (Location)
- What – the property is (Construction)
- What – is insured (Risk)
- How Much – the property is insured for (Value)

What do Users Want to Know

- | | |
|-----------------------|-------------|
| ■ Where | Location |
| ■ How much | Aggregation |
| ■ What if | Scenario |
| ■ How bad can it get? | Portfolio |

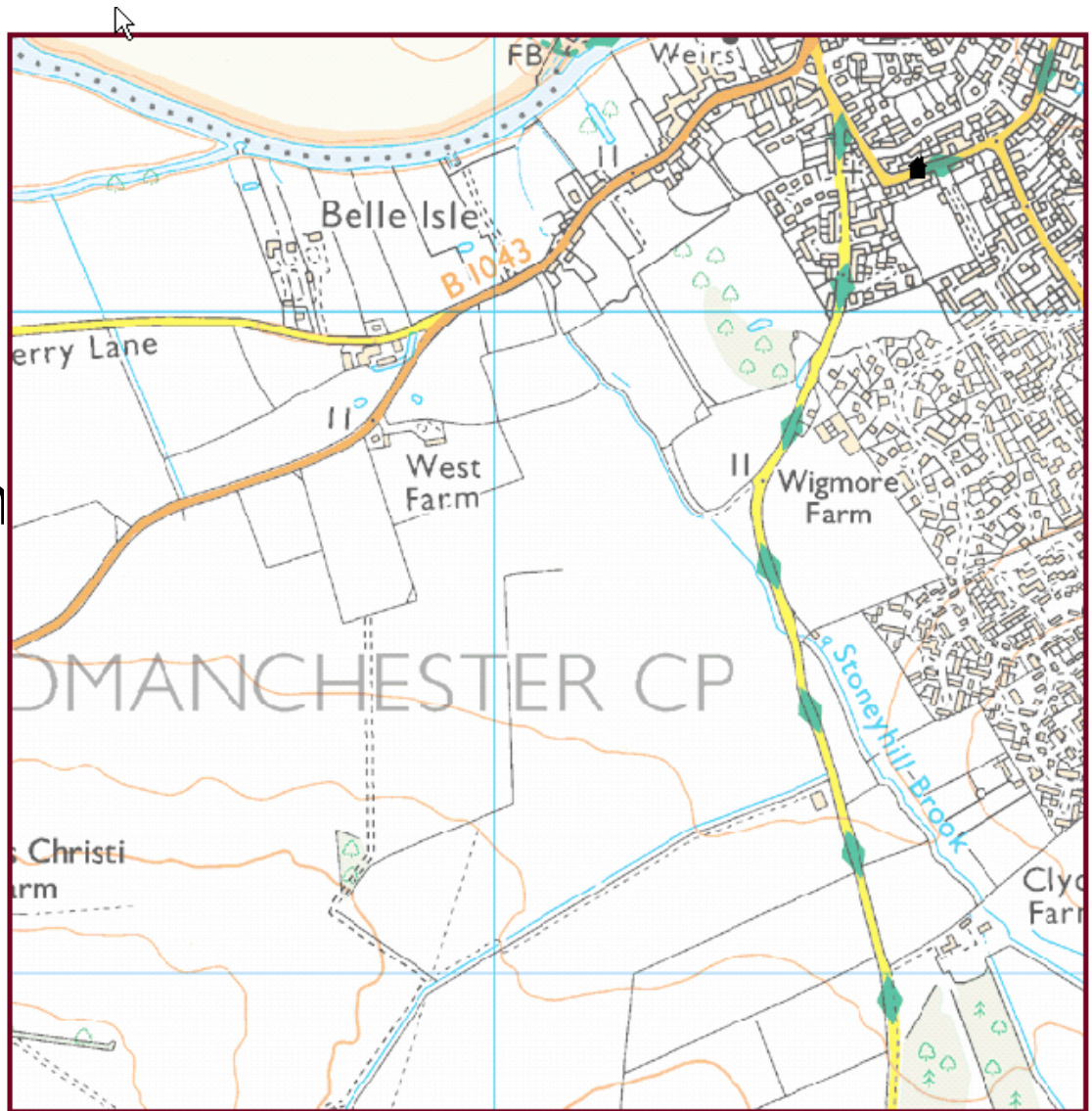
Query Types

- Location & Aggregation
 - What is where and its Sum Insured
- Scenario and Portfolio
 - Stochastic distribution of claims

Location

Small Picture

- Risk Examination
 - Individual items



Location

Example:

- Belle Isle

- 100m from the Great Ouse

- Wigmore Farm

- Built 2007/08

- Both EA “Low” risk



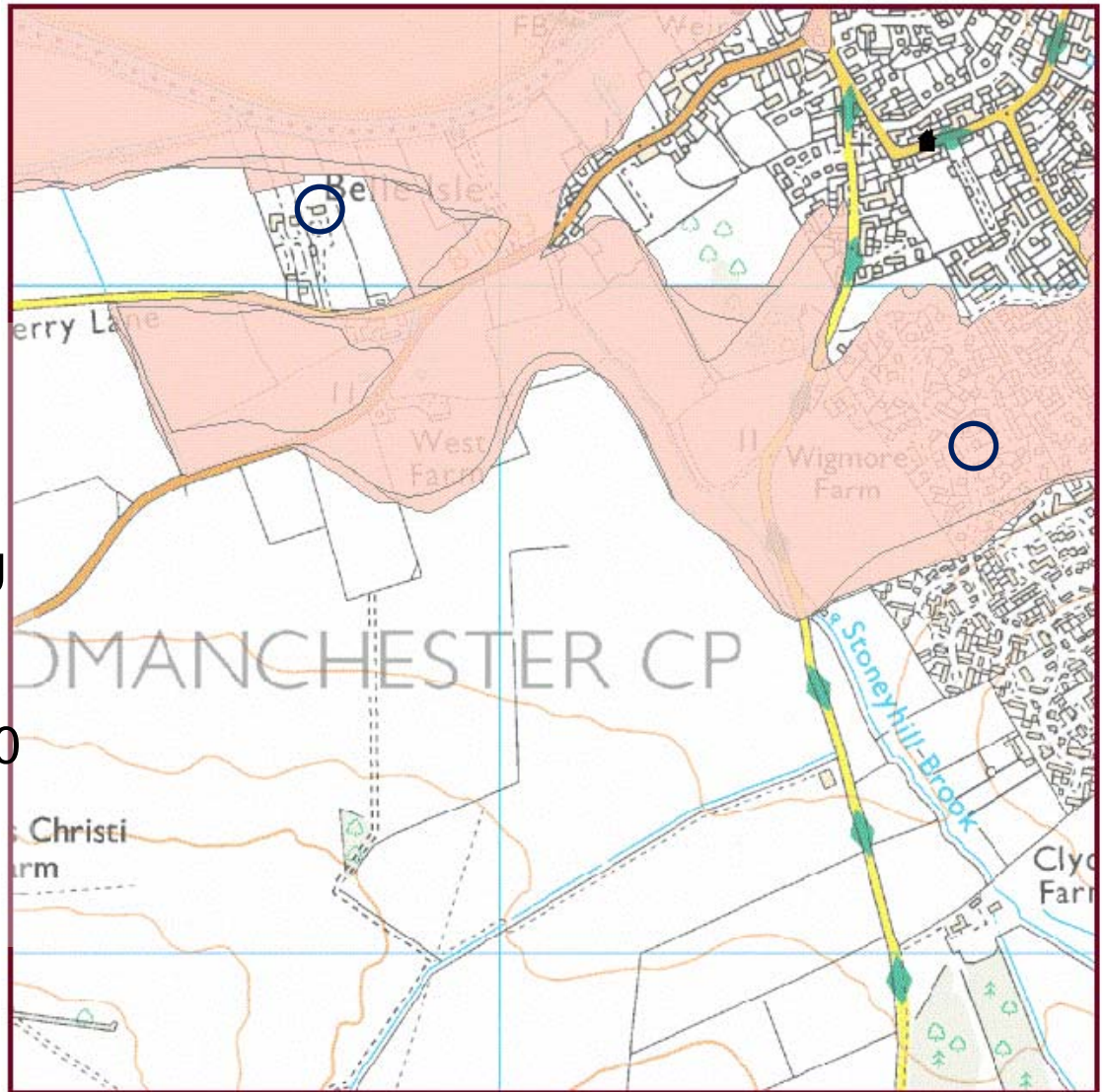
Location

- Belle Isle

- No recorded flooding

- Wigmore Farm

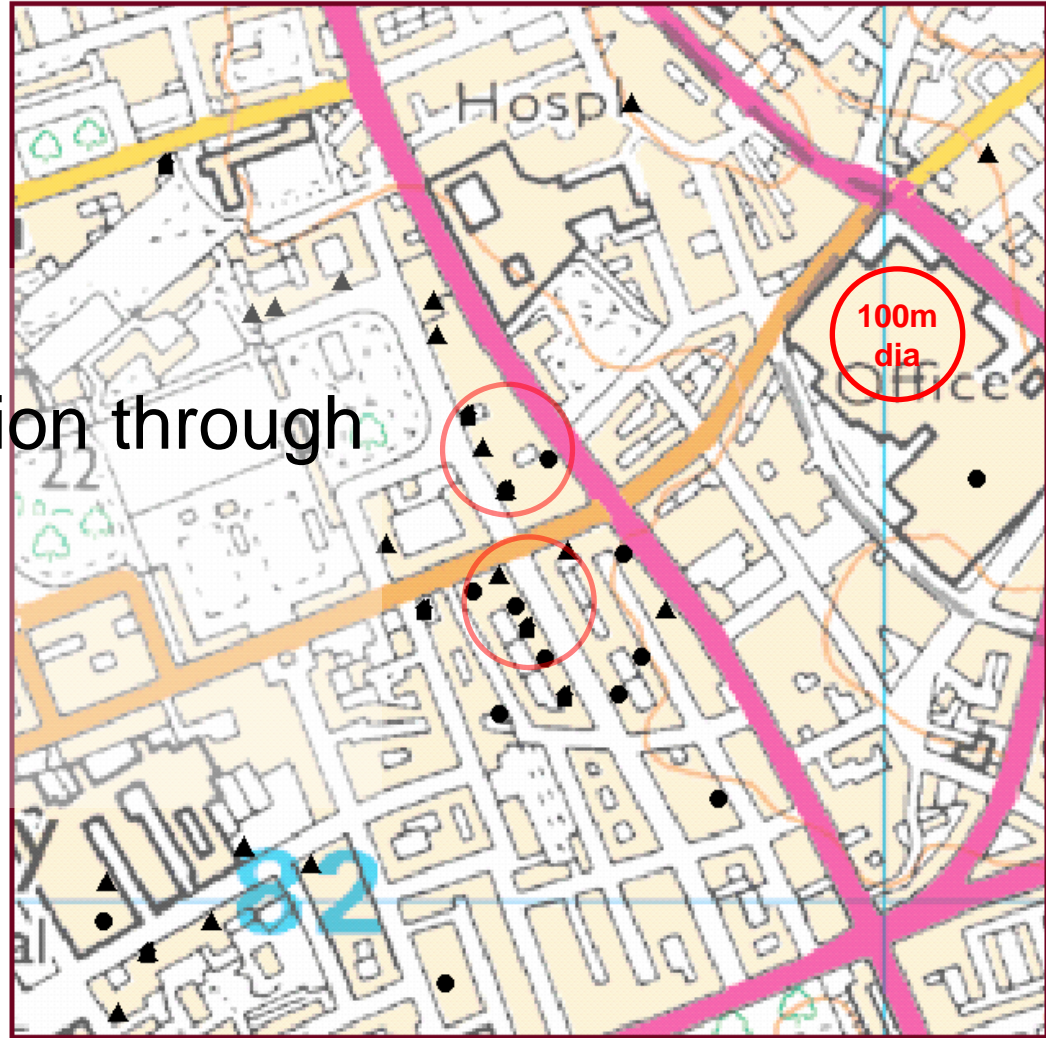
- Flooded 3 times in 50 years



Location

Clusters

- Managing aggregation through underwriting



Location

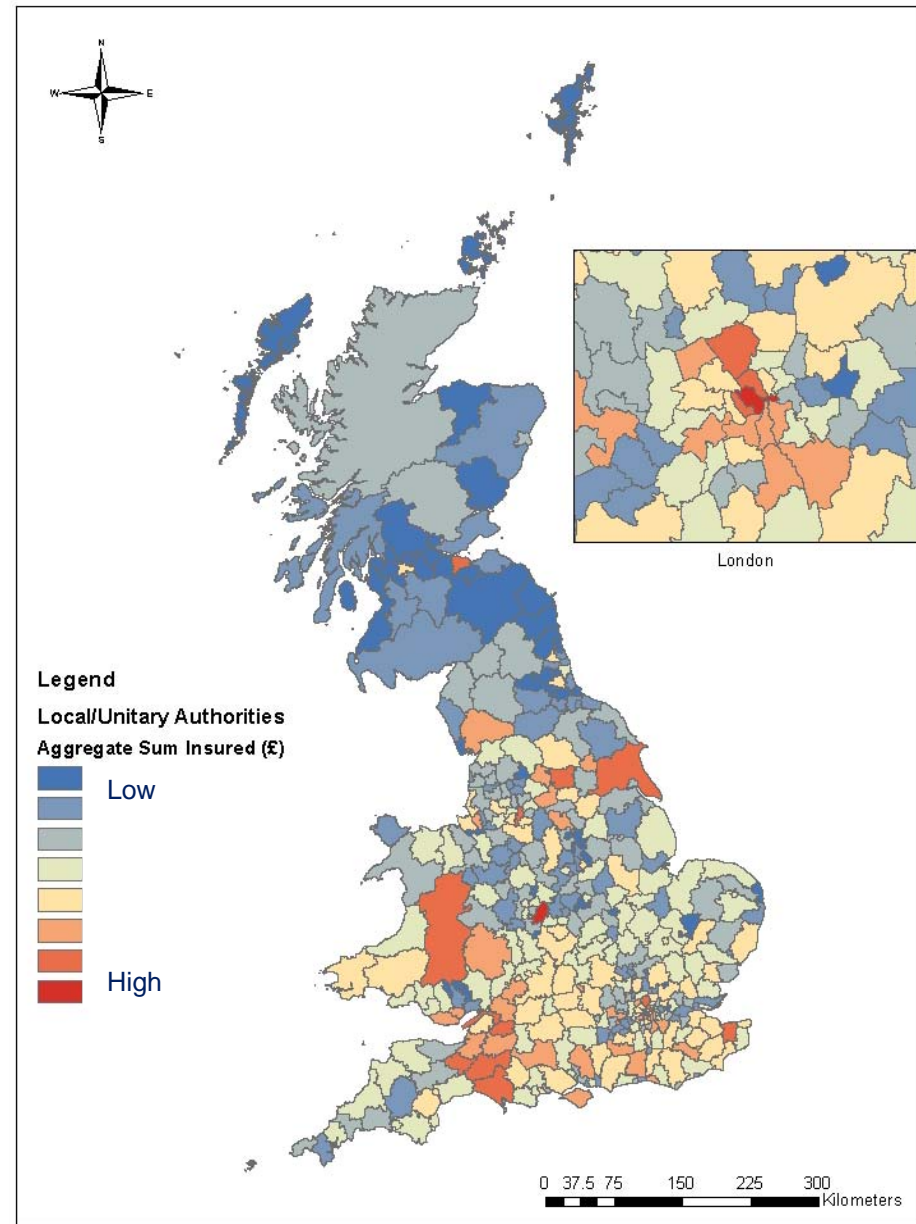
Big Picture

- Where properties are:
 - Shows clusters of risks
 - “All risks EML > £50 million?”
 - Shows nearby risks
 - Shows localised hazards



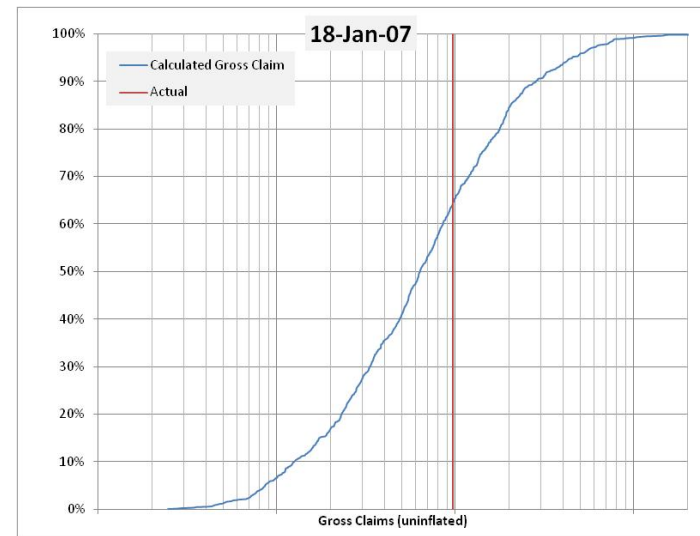
Aggregation

- Shows the Big Picture
 - Aggregate sum insured
 - Using EML
 - All perils
 - All classes

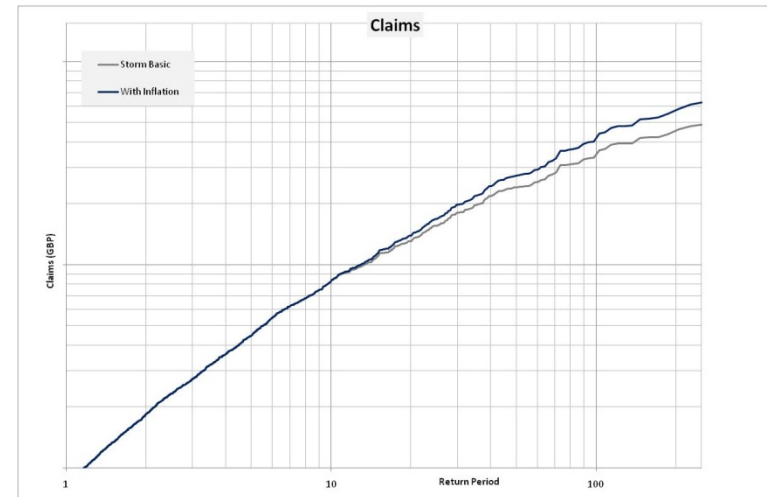


Scenario

- Covers 2 different types:
 - As if (Historic)
 - Defined Hypothetical (e.g. RDS)
- Results are distributions
- Can view extent through Location queries



Portfolio



- Stochastic distribution of “all” possible events
- Perils:
 - Storm (Windstorm)
 - Flood (Flood – including costal)
 - Wet Storm (Storm and/or Flood)
 - Fire

Uses

- Underwriting Support
- Underwriting Management
- Aggregation Control
- Portfolio Management
- Reinsurance Purchase
- Capital Allocation
- Claims Management

Conclusion

- Not a “Cat model”
- Understanding of current risks has improved
- Management of risks improving
- **GIGO**