# State of Catastrophe modeling

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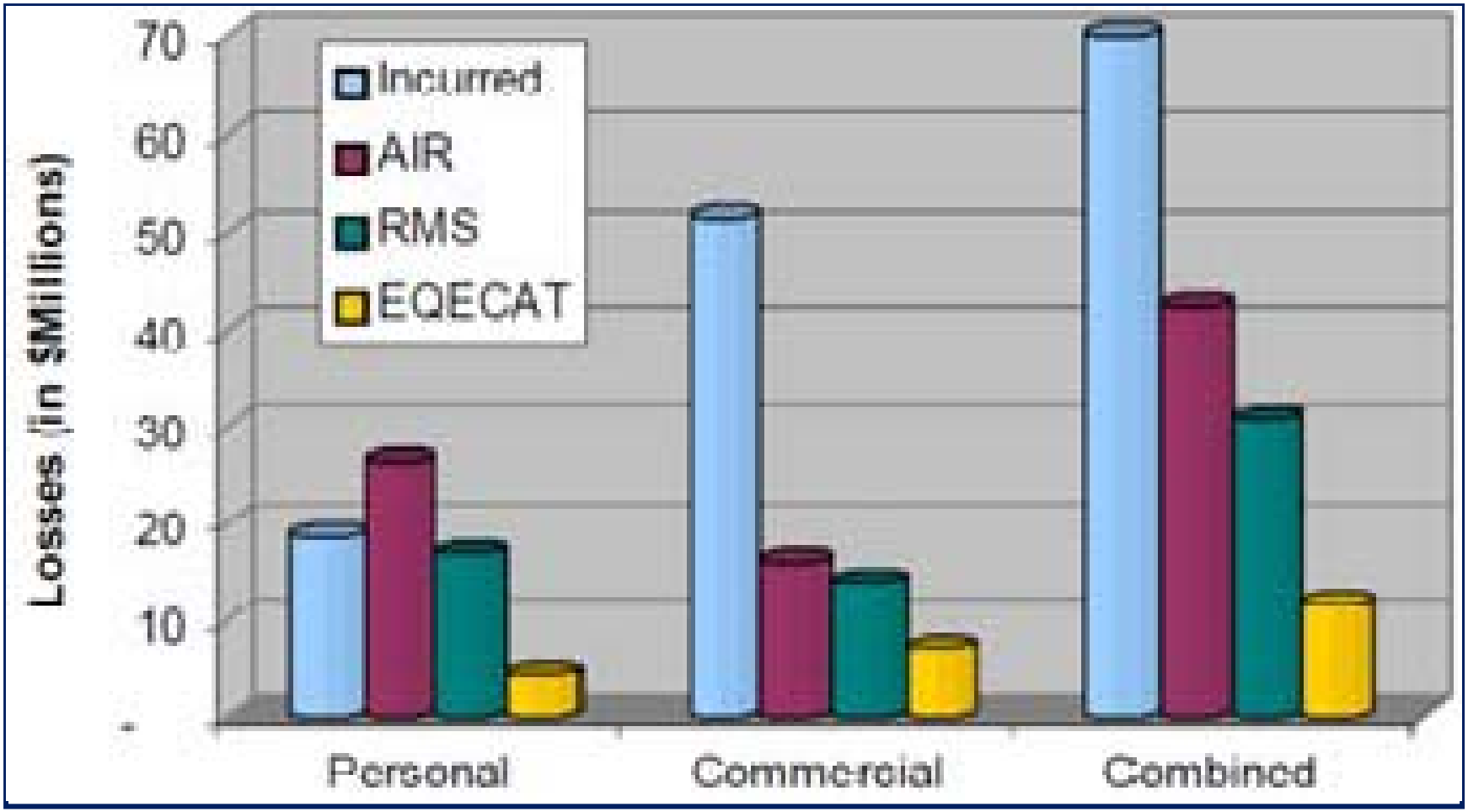
# Missing Million Dollars!



# Models are tools, not the truth!

- In general, when it comes to disaster response for hurricane, the catastrophe models are falling short of the mark. (Towers Perrin (2006) )
  - '...the degree to which companies got their fingers burned [after Ike] was a function of their relative degree of reliance on cat models...'
- This is in large part because by nature, cat models are a mathematical representation of reality.
  - 'like any model, the validity of[**cat model**] output is contingent upon the quality of the data and underlying assumptions. (A.M. Best (2006))

# Event Loss Tables

| Event number | Event frequency | Event mean severity | Standard deviation | Exposure value |
|---|---|---|---|---|
| ... | ... | ... | ... | |
| 17.980 | 0,00000221 | 38.356.270 | 27.022.031 | 9.210.798.292 |
| 17.295 | 0,00001687 | 38.167.747 | 26.977.425 | 7.894.969.965 |
| 17.853 | 0,00001646 | 37.025.203 | 26.350.968 | 8.913.675.766 |
| 17.368 | 0,00000392 | 36.776.847 | 26.281.579 | 8.870.752.769 |
| 18.001 | 0,00001261 | 36.227.882 | 25.276.448 | 8.127.174.963 |
| 17.463 | 0,00001151 | 35.988.900 | 25.456.216 | 9.059.801.599 |
| 17.891 | 0,00001650 | 35.791.078 | 25.319.642 | 9.224.327.305 |
| 17.851 | 0,00000524 | 35.291.528 | 25.137.023 | 12.560.179.489 |
| 17.982 | 0,00000184 | 35.231.846 | 24.804.156 | 9.661.676.530 |
| 17.406 | 0,00003356 | 35.007.636 | 17.228.653 | 8.840.103.294 |
| 17.985 | 0,00000046 | 34.891.374 | 24.596.462 | 9.641.786.132 |
| 18.004 | 0,00001485 | 34.859.180 | 24.256.934 | 7.675.665.243 |
| 17.893 | 0,00001171 | 34.752.674 | 24.663.413 | 12.470.617.780 |
| 18.006 | 0,00001539 | 34.630.376 | 24.146.792 | 9.528.412.026 |
| 17.462 | 0,00000430 | 34.405.417 | 24.352.597 | 7.988.781.079 |
| 17.645 | 0,00004261 | 34.335.089 | 7.222.209 | 10.633.160.763 |
| 17.975 | 0,00000079 | 34.305.860 | 24.103.868 | 7.894.969.965 |
| 17.386 | 0,00000113 | 34.255.982 | 24.262.113 | 12.799.293.564 |
| 17.887 | 0,00000695 | 34.000.040 | 23.842.394 | 9.339.685.958 |
| 17.984 | 0,00000346 | 33.574.772 | 23.679.793 | 10.392.415.990 |
| 17.981 | 0,00000042 | 33.151.588 | 23.267.874 | 7.859.333.501 |
| 17.983 | 0,00000015 | 32.930.112 | 23.175.486 | 8.747.473.765 |
| ... | ... | ... | ... | ... |

All data in €.

Figure 2: Part of an event loss table for storm insurance divisions

# California EQ Authority Policy!

| Option | Type of Coverage | Amount of Coverage | Deductible | Current Basic Policy for Type of Coverage |
|---|---|---|---|---|
| Option 1 | Structure | 50% | 10%, 15%, 20%* | 100% with 15% deductible |
| Option 2 | Contents | $25,000, $50,000, $75,000 or $100,000 | 10%, 15%, 20%** | $5,000 with no deductible |
| Option 3 | Loss of Use | $10,000 or $15,000 | No deductible | $1,500 with no deductible |

# Visual Business Intelligence

- A class of post-disaster response data,
- Which using high-resolution aerial and satellite reconnaissance images
- Captured in near-real time after the event,
- Provides companies with an objective visual assessment of the real world situation.

# Oil facilities in Texas – Ike 2008

**Before Hurricane**

**Visuals after Hurricane**

# CAT Events

| Katrina, IKE/Gustav | New Zealand EQ | Thailand floods |
|---|---|---|
| • Flooding,<br>• Storm surge<br>• Wind damage<br>• Demand surge | •One-in-10000 year EQ (Mercalli 6.3) Unforseeability of loss<br><br>• Widespread liquefaction – 10 multi storied buildings and 10000 other buildings damaged<br><br>•Hazard assessment questions<br><br>•Reliability of building codes tested | •Inland flood causing BI losses and CBI losses<br><br>•Low insurance density – Heavy losses<br><br>•Four fifths of industrial losses – Japan companies who relocated to Thailand after triple disaster |

Source: Munich Re Publication Topics Geo 2012

# CAT Events - Lessons learnt

- What credibility do models have?
- How they should be used in Business sense?
- There are limits to probabilistic approach.
- Probabilistic approach to be supplemented by a deterministic worst-case scenarios.
  - 3 nuclear accidents in 32 years
  - Existential – threat events
  - We need to be more creative and imaginative about SERIOUS CONSEQUENCES

Source: Munich Re Publication Topics Geo 2012

# Cat Events - Lessons learnt

- Time dependent hazard assessement –
  - Where we are in the cycle?
- Disaster risk chain is a very complex phenomenon
- Social implementation gaps
- Interconnectedness of Global economy
- Limits to even Governments being the last Resort for damage compensation

Source: Munich Re Publication Topics Geo 2012