

Why use Catastrophe Modeling? India at the Cross Roads

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AIR has Successfully Helped Companies Manage Risk Worldwide

- AIR, founded the catastrophe modeling industry in 1987, and today models the risk from natural catastrophes and terrorism in more than 90 countries
- More than 400 insurance, reinsurance, financial, corporate, and government clients rely on AIR software and services for catastrophe risk management
- AIR is a member of the Verisk Insurance Solutions group at Verisk Analytics
- AIR in India (Hyderabad) from 2000

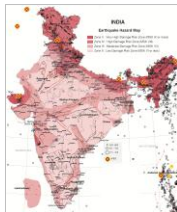


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India Because it is Exposed to Different Perils Needs to Understand and Evaluate its Risk Better

- India is prone to earthquakes, cyclones, floods, drought, tsunami, monsoon, etc.
- 80% of the land area is subjected to one or more perils
 - Approximately 7% of the Indian land mass and about 5770 km of coastline is prone to cyclones, tsunamis and storm surge
 - 59% land is prone to earthquakes with about 11% land prone to severe earthquakes
 - 40 Million hectares are prone to flooding, with an average annual area affected at about 7.5 million hectares
 - Almost 1/6th of the geographic area (i.e. 50 m hectares) is drought prone, comprising about 68% of the cultivable area



Vulnerability Atlas of India



Maps of India



Maps of India



Vulnerability Atlas of India

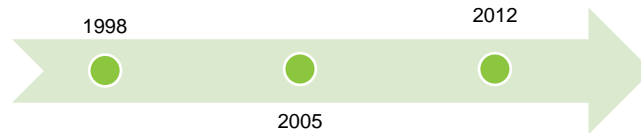


Significant Loss Causing Events from the Past

- 1998 Gujarat Cyclone
 - 500 million USD economic loss (250 million insured loss), 1,500+ deaths
- 1999 Orissa Super Cyclone
 - 2.5 billion USD economic loss (100 million insured loss), 15,000+ deaths
- 2001 Gujarat (Bhuj) 7.7 Mw Earthquake
 - 4.0 billion USD economic loss, 20,000+ deaths, 350,000 buildings damaged
- 2002 July Drought
 - Approximate crop damage was 1.0 Billion USD
- 2004 Sumatra Andaman 9.2 Earthquake and Tsunami
 - 1.0 billion USD economic loss (India), 16,000+ deaths (India)
- 2005 Mumbai July Floods
 - 944 mm rainfall in Santacruz in 24 hrs at high tide
 - 100+ low lying areas affected
 - Insured losses to the tune of 2500+ crores



Though, the Last Few Years has been “Relatively” Catastrophe-free, it Does not Mean India is Safe



- Is the risk due to natural disasters decreasing?
- Where we fortunate?
- Is this the calm before the storm?

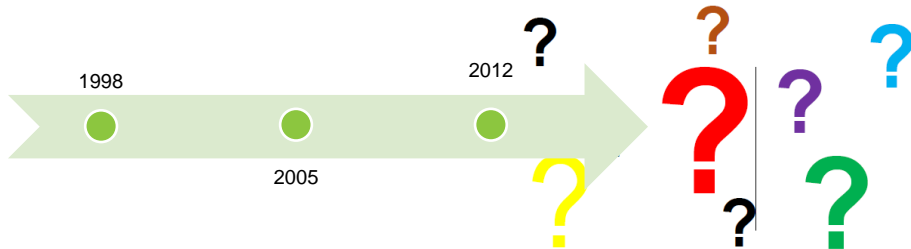


The Catastrophic Losses of 2011 is Yet Another Wake Up Call to the Industry of the Large Loss Potential

- A lot of unexpected events have happened ... especially in the Southeast Asia
- With \$380* B in economic losses 2011 is the worst year in history
- With \$105* B in insured losses 2011 is the second worst year in history
- March 11th Tohoku Earthquake of 9.0 Mw is the largest contributor to the losses ... both economic (\$210* B) as well as insured (\$35-\$40* B)
 - Shake Losses are about 2/3rd of the total losses
 - Tsunami losses are at about 1/3rd of the total losses
- Christchurch Earthquakes
 - Three earthquakes in about 14 months ravaging the same area
 - Total insured losses in the vicinity of \$13* B and counting
- Thai Floods
 - Happened in a country which was thus far considered “CAT Free”
 - Losses of about \$10* B and counting with economic losses at \$40* B



Though, the Last Few Years has been “Relatively” Catastrophe-free, it Does not Mean India is Safe



- What's in store next year ...
- The question is not what will happen next year ... however are we prepared for what can happen next year
- It's not as important to know what events can happen but more importantly what losses can happen



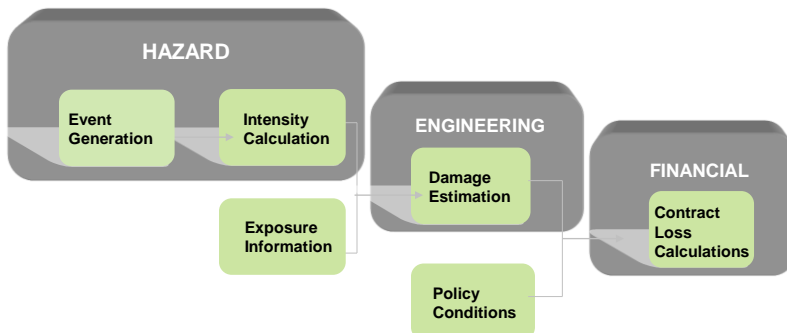
CATASTROPHE Models Can Provide the Answers

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What are Catastrophe Models?

“Catastrophe model is a very detailed loss computation system that creates probabilistic loss distributions for individual as well as for a portfolio of risks using a sophisticated simulation process”



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Why Do We Need Catastrophe Models?

- Catastrophes are by definition, Infrequent, Unpredictable, and have Large Impacts
- Due to the low frequency of severe catastrophes, traditional methods that rely on company claims data may not be a good predictor of possible losses
- The constantly changing landscape of exposure data limits the usefulness of past loss experience
 - New properties continue to be built in areas of high hazard
 - Building materials and designs change
 - New structures may be more or less vulnerable to catastrophic events than the old ones



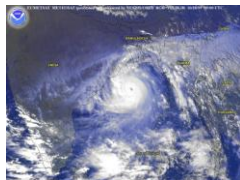
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What Questions are Catastrophe Models Designed to Answer?

- Where are future events likely to occur?
- How big are they likely to be?
- How frequent?
- For each potential event, what will be the damage and insured losses?

Models should capture all possible events before they occur to ensure they provide an objective and stable view of risk



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Mumbai Floods Losses ... is this really a 1/100 Year Loss? What Other Questions Should I be Asking?

- Mumbai Flooding Event is considered by the industry as a 1/100 year loss event
 - Loss pegged at around INR 2500 to 3000+ crores in insured losses for the Industry
- If the Industry is looking at Mumbai Flood Event/Losses as a benchmark for managing risk ...
 - Are there other events that can equal/exceed the Mumbai Loss?...
 - Are there other areas where such or higher losses occur? ...
 - What is the likelihood of having the Mumbai loss exceeded? ...
 - Can multiple smaller event losses happen in a year that can result in a loss equal to or greater than the Mumbai Loss? ...

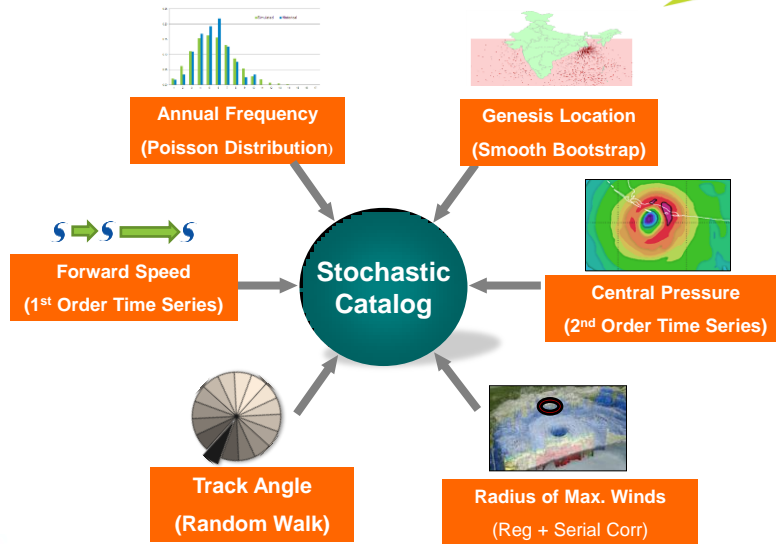


AIR Cyclone Model for India

- AIR is pleased to release a fully probabilistic cyclone model for India
 - Explicit Wind modeling
 - Explicit Precipitation Induced Flood modeling
 - Explicit vulnerability relationships by Construction, Occupancy, Age and Height
- Started the research and development on this model in 2009 and model will be released in June 2012 for insurers, reinsurers, reinsurance brokers worldwide.
- Executed an MOU with GIC Re on the development of the Model for the Insurance Industry in India.

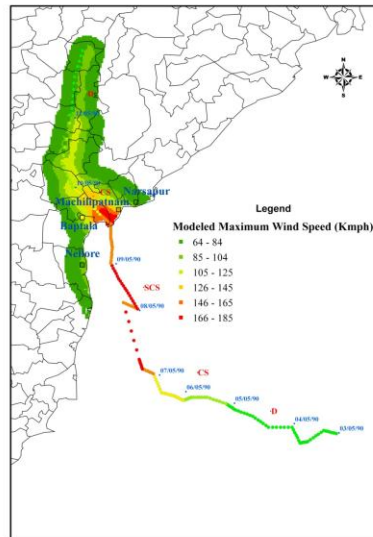
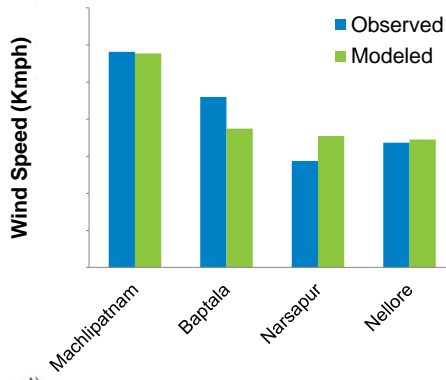


Stochastic Cyclone Catalog is Generated from Distributions and Models of Storm Characteristics

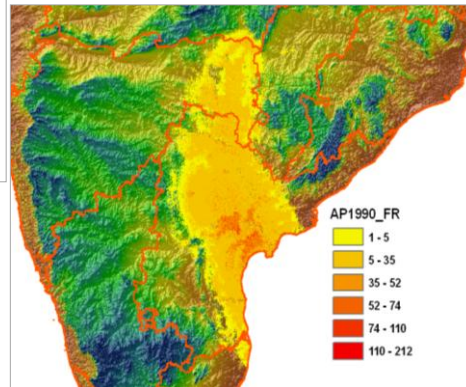
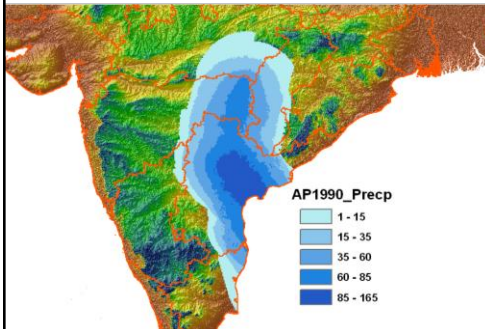


Wind Speeds are Validated Based on Data from Historical Cyclones - AP Cyclone 1990

Comparison - Modeled vs Observed Wind Speed

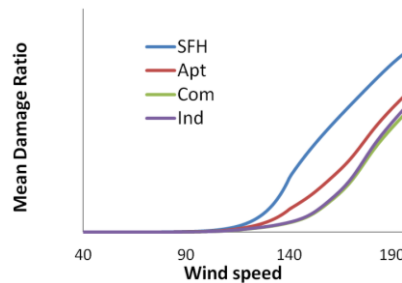
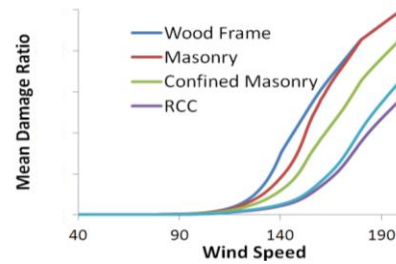


Andhra Pradesh, 1990 – Precipitation and Accumulated Runoff

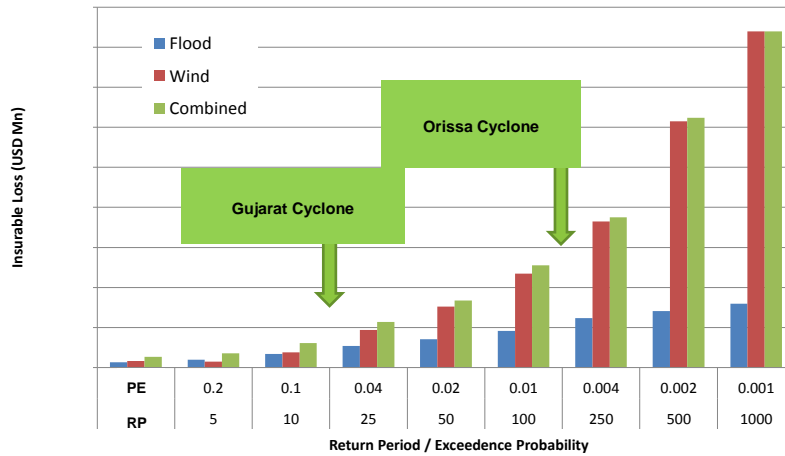


Vulnerability by Construction and Occupancy Type

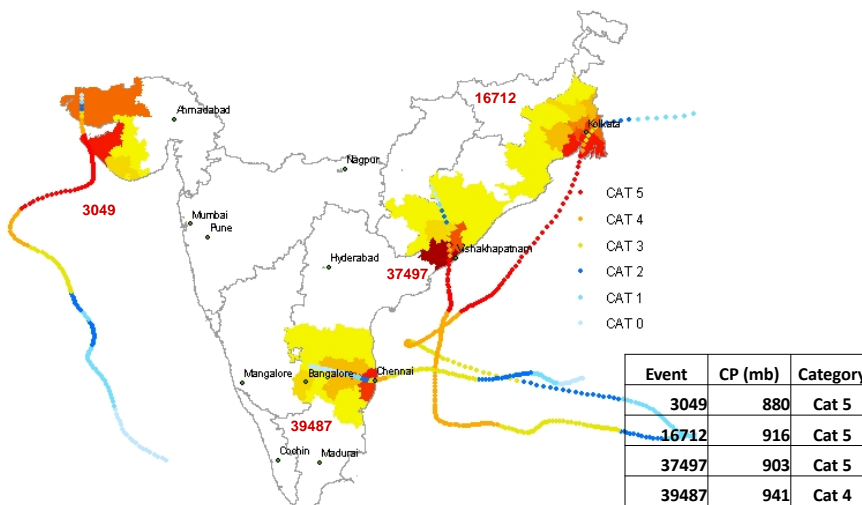
- Wind damage functions for select low rise commercial buildings
- Wind damage functions for select low rise RCC buildings
- Roof type is aggregated in construction vulnerability



Annual Occurrence Losses - EP Curve

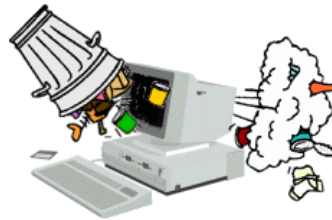


Events which can cause 0.01 (100 yr) Exceedance Probability Modeled Wind+Flood Loss



Reliability of Model Output is as Good as the Quality of Exposure Data Used as Input

- High quality exposure data is essential for effective catastrophic risk management, improved underwriting and reinsurance decisions
- Assessing and ensuring the quality of the underlying exposure data used for catastrophe risk analyses can be challenging
- A comprehensive effort to improve exposure data quality can improve decision-making across the enterprise and can provide a competitive advantage

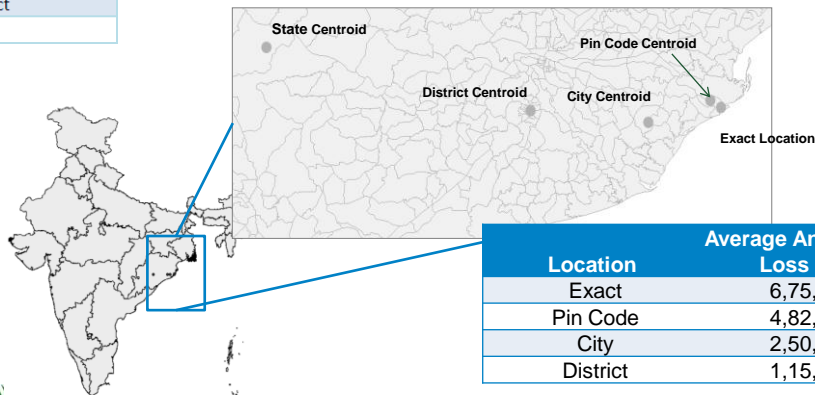


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Exposure Data Relevant for Modeling

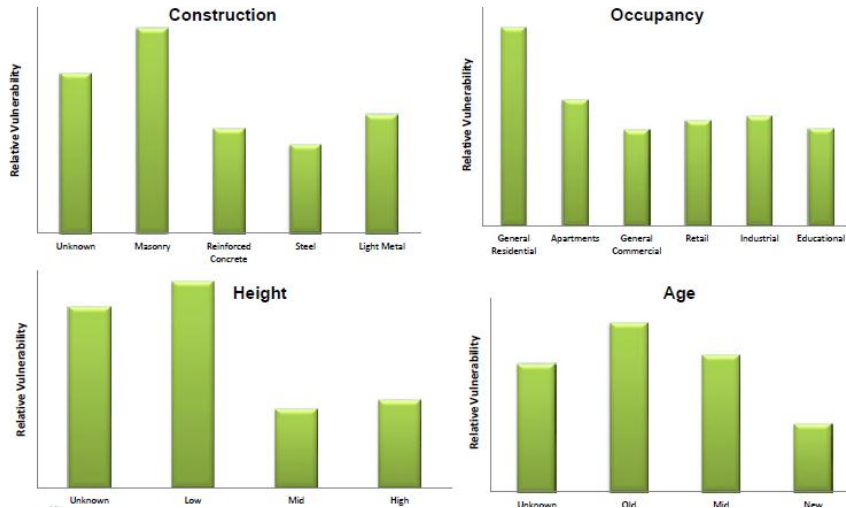
Location	Building Characteristics	Replacement Values	Insurance Terms
Latitude/Longitude	Construction Type	Building	Deductibles and Limits
Street Address	Occupancy Class	Appurtenant Structures	Reinsurance Terms and Conditions
Pin Code	Year Built	Contents	
City	Height	Time Element	
District			
State			



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Construction, Occupancy, Height and Age can Impact the Catastrophe Losses Estimates



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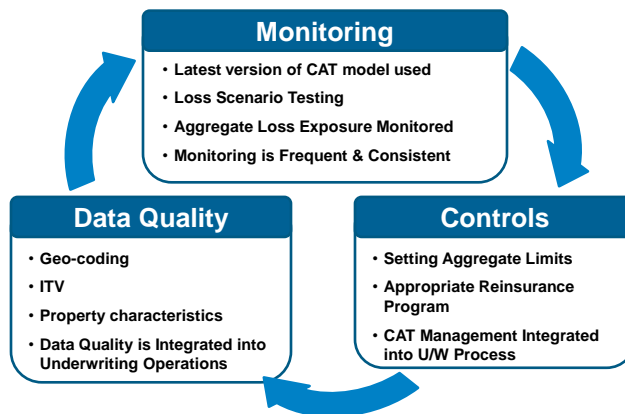
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A.M. Best: "Catastrophe Risk is a Primary Threat to Insolvency"

"No single exposure can affect policyholder security more instantaneously than catastrophes"

"Understanding financial condition both before and after an event is a critical rating factor"

"A.M. Best will continue to put a high degree of emphasis on catastrophe risk management."



*Original AM Best Presentation can be found at

www.business.appstate.edu/brantley/pdfs/RichardAttanasio.ppt



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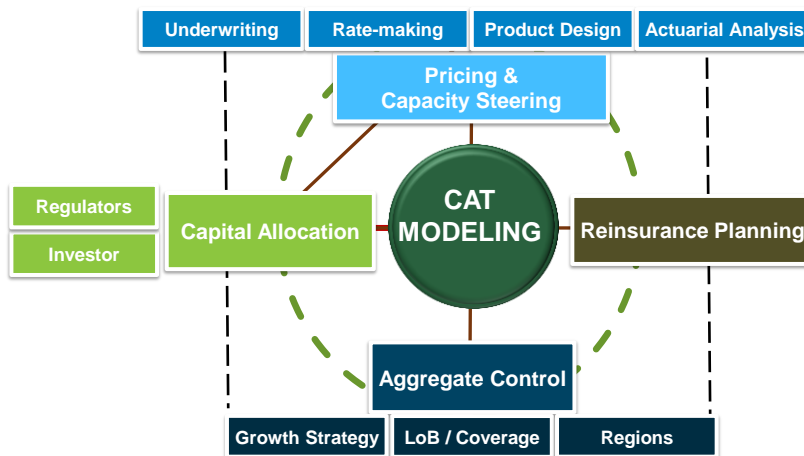
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Regulatory Frameworks Such as Solvency II Increasingly Utilize a Risk-Based Capital (RBC) Approach

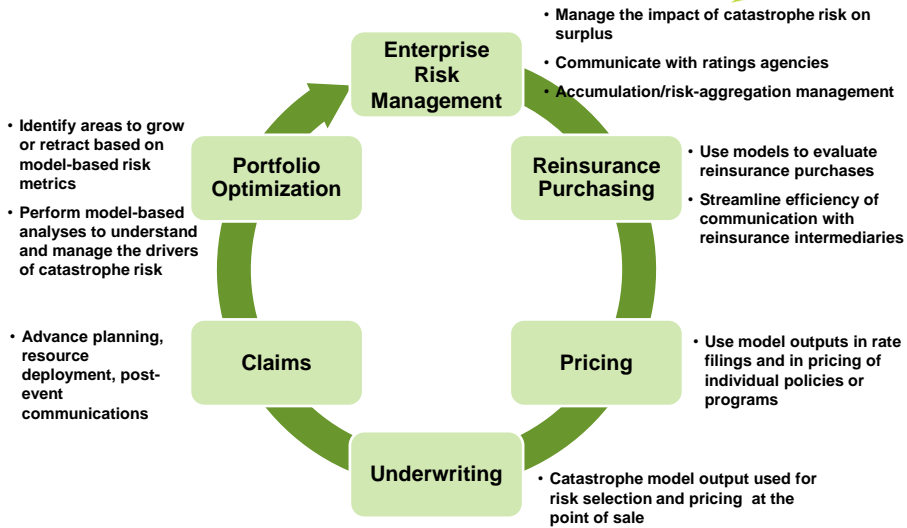
- Method to measure the minimum amount of capital that an insurance company needs to support its overall business operations
- Risk-based capital is used to set capital requirements considering the size and degree of risk taken by the insurer



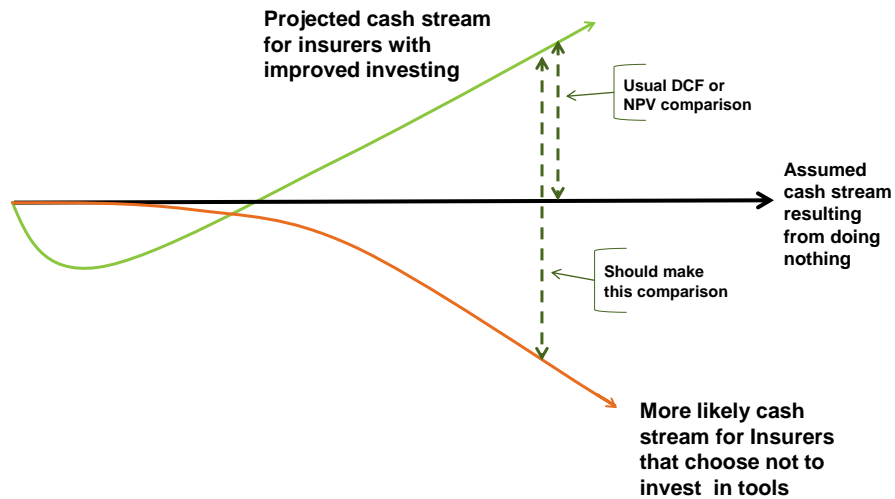
Catastrophe Modeling is Central to Risk Management



Insurers Use Catastrophe Models Across Multiple Functional Areas



The High Cost of the Status Quo



The P/C Industry in India is at the Cross Roads of CAT Models Adoption ...

Aggregate Data
No CAT Models
Business as usual

Detailed Data
CAT Models
Best Practices

