

Natural Catastrophe vs Cyber Modeling CAS Annual Conference

TigerRisk Partners

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THE NEW BREED IN RISK MANAGEMENT & CAPITAL SOLUTIONS



COMPARE & CONTRAST MODELING ASPECTS OF NATURAL CATASTROPHE AND CYBER MODELING

- Peril Definitions
- Exposure
- Hazard
- Vulnerability & Damage
- Loss

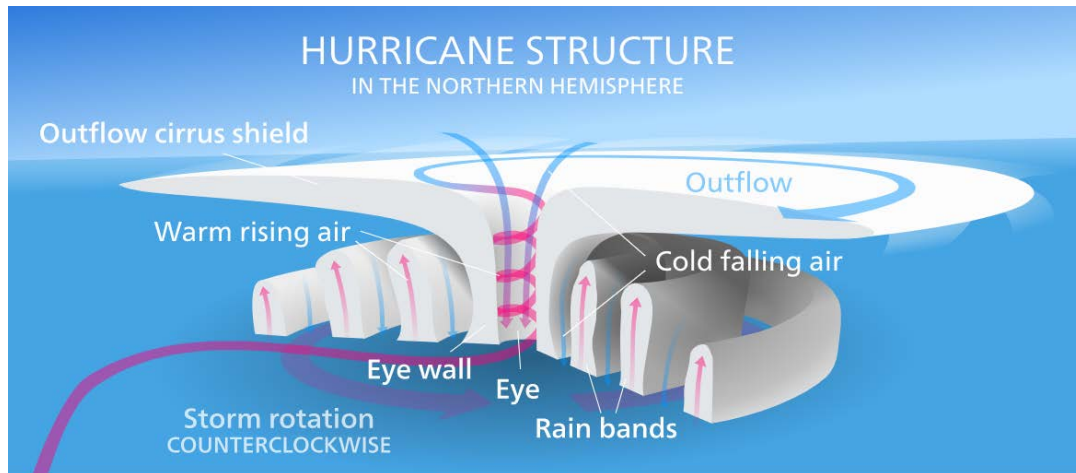
Natural Catastrophe (Nat Cat) vs Cyber Modeling

	Nat Cat Modeling	Cyber Modeling
Exposure	Structure at a geographic location	Individual company
Hazard	Geocoding Wind speed Distance to coast	Company matching Firmographics Technographics
Vulnerability	Construction Occupancy Roof attributes	Firmographics Technographics
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Loss	Coverage A Coverage B Coverage C Coverage D	BI, CBI Cyber Extortion Data Breach etc....



First – Defining the Peril

Nat Cat modeling: Distinct perils with understood definitions



By Kelvinsong - Own work, CC BY 3.0,
<https://commons.wikimedia.org/w/index.php?curid=23226142>

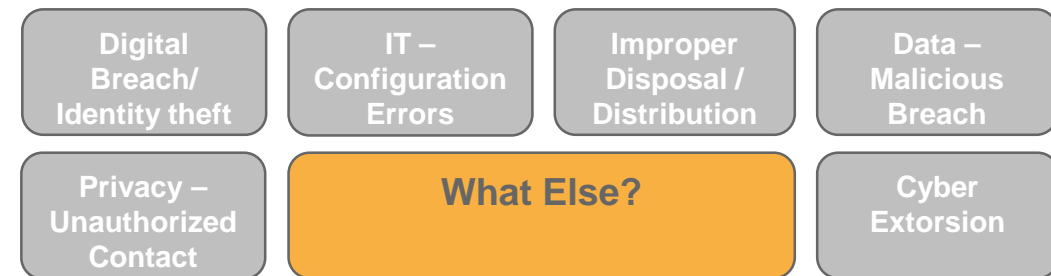
- Hurricane are comprised of wind, storm surge and precipitation flood
- Definition is industry accepted and does not change
- Can evaluate all potential hurricanes based on current scientific understanding of hurricane behavior

Cyber modeling: Variety of event types driven by company-specific vulnerabilities



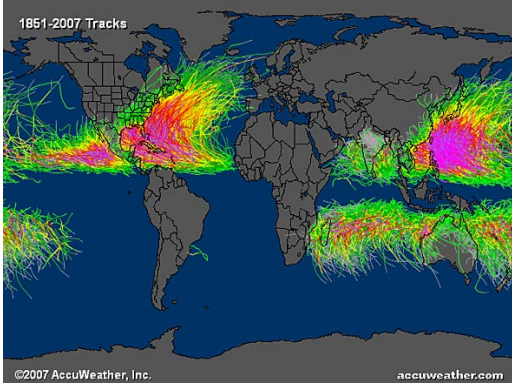
Individual Events: Events impacting a single company, usually involving some type of company-targeted hacking or data loss (such as a data breach or ransomware).

Accumulation Events: Events impacting multiple companies, usually involving some common system that goes down, resulting in business interruption (such as a cloud server going down)

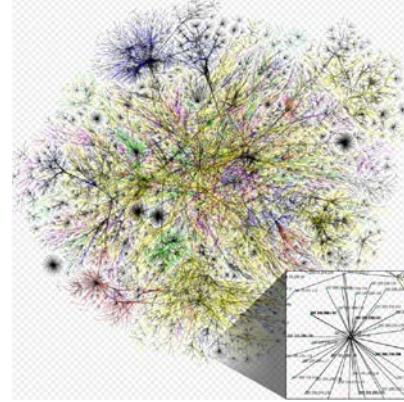


Exposure

Nat Cat modeling: Structures on Earth's surface

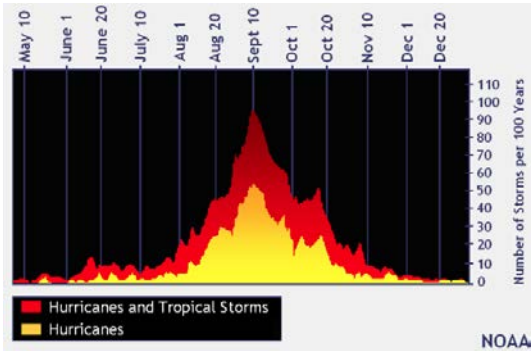


Cyber modeling: Company's connection to the internet

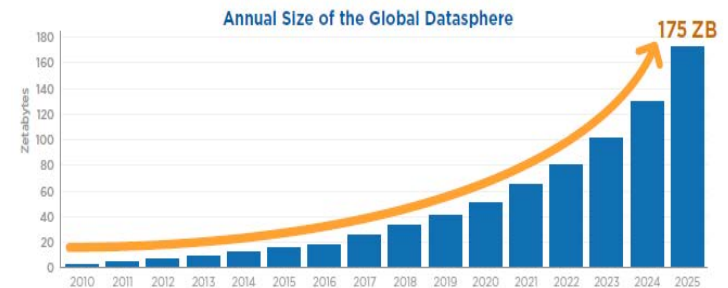
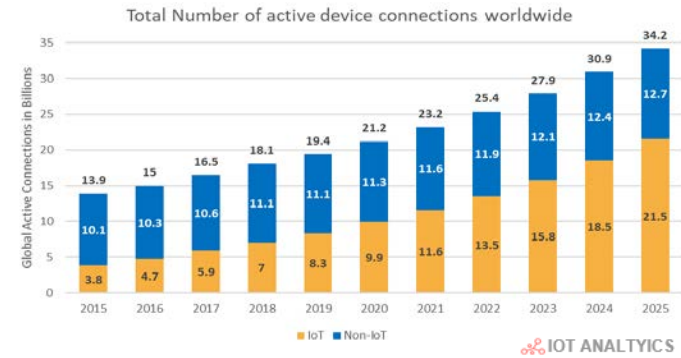
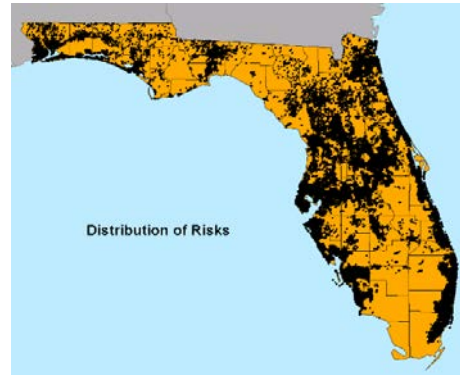


Geography

Changes in geography affecting hazard



NOAA – North Atlantic Hurricane season goes from June 1 – Nov 30, with the peak of the season ranging from mid-August to late October



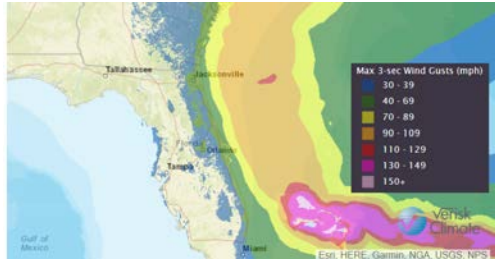
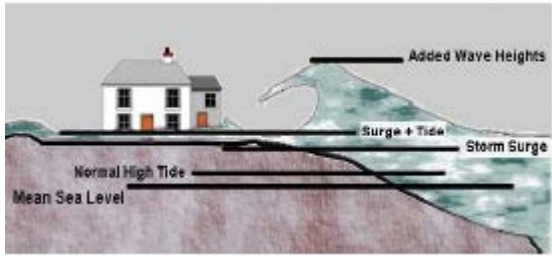
Source: Data Age 2025, sponsored by Seagate with data from IDC Global DataSphere, Nov 2018

Geography

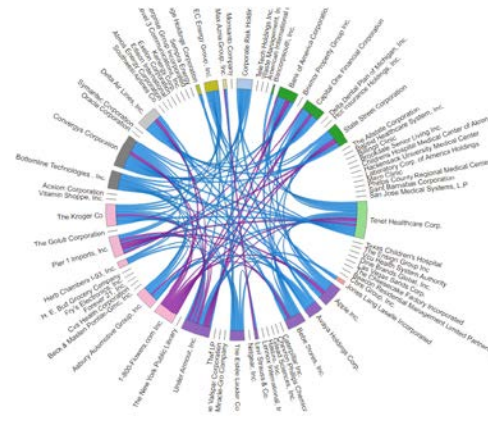
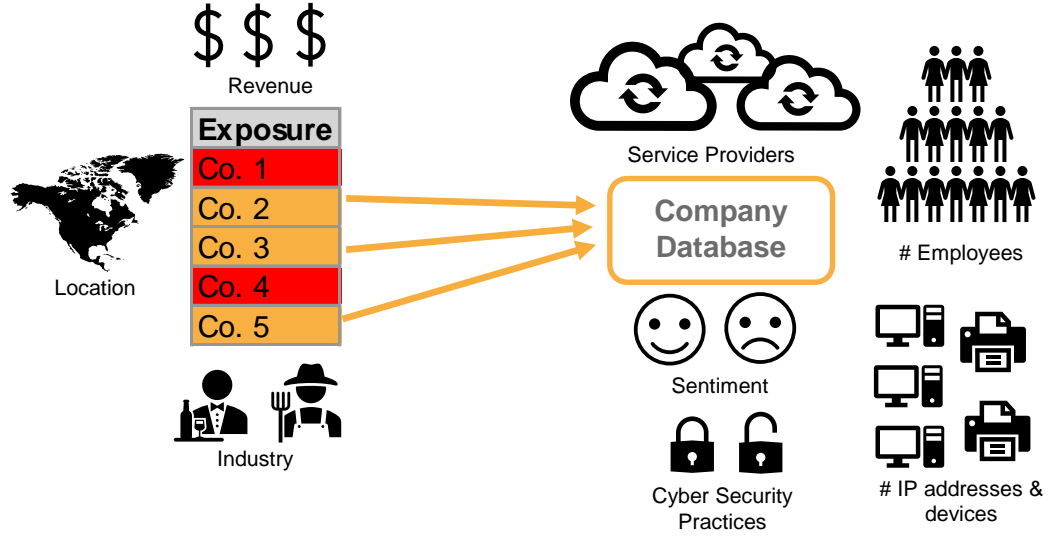
Changes in geography affecting hazard

Hazard

Nat Cat modeling: Physical properties of peril and structure



Cyber modeling: Company firmographic and technographic data



Matched or Unmatched

Firmographic & Technographic Fill

Shared Accumulation Paths



Geocoding Resolution

Loss-inducing local hazards

Risk Proximity

Vulnerability and Damage

Nat Cat modeling: Static, user-controlled risk characteristics determine vulnerability.

- Static risk characteristics define vulnerability at different locations
- Primary: Construction, occupancy, number of stories, square footage
 - Most insurers capture this information and are able to input it into the cat models
- Risk characteristics do not usually change with time unless there is an update to building codes or buildings are torn down and re-built



<https://www.sihle.com/windmitigationinspections/>

Cyber modeling: Variety of event types driven by company-specific vulnerabilities



Industry: Hospitality

Revenue: \$20.75B

Record Count: Unknown – up to 500M accessed in 2018



Hydro

Industry: Manufacturing

Revenue: \$12.17B

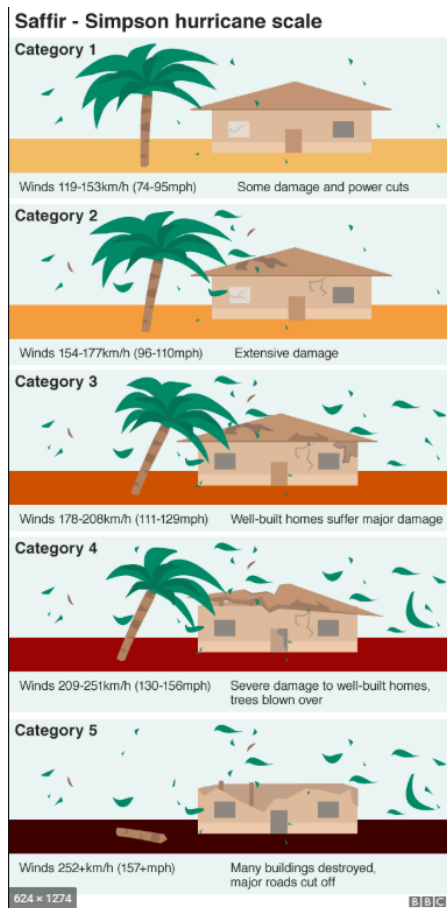
Operating System: Windows

- Industry and revenue are user-controlled inputs that are commonly known about the risk
- Most information determining a risk's vulnerability is not known
 - Number of records, patching cadence, cloud servers used
- Cyber modeling is incredibly company specific, rely on models to collect and organize this information
 - Hard to handle the “unknown” case
- Risk characteristics can change easily



Vulnerability and Damage

Nat Cat modeling: Use peril characteristics against risk characteristics to calculate damage



- For Hurricane, comprised of Wind, Storm Surge and Precipitation Flooding
- Different construction, occupancy, roof shapes, etc perform differently at different wind speeds
- Use the MDR at each risk characteristic to calculate damage

Cyber modeling: Variety of event types driven by company-specific vulnerabilities

- Damage dependent on type of attack and type of vulnerability exploited
- **Marriott: Number of records**
 - Reputational damage
 - Third party damage
- **Norsk Hydro: Compromised systems/system downtime**
 - Ransom damage?
 - Business Interruption damage?
- Depends on type of attack, often multiple types of damage within one event

Loss

Nat Cat modeling: Industry accepted, well defined coverages that are consistent across models and perils

Cyber modeling: Inconsistent coverages offered, disagreement between models and industry

WHAT DOES HOMEOWNERS INSURANCE COVER?

Homeowners insurance may help protect your house, your belongings and even you if the unexpected occurs. Typical policies include four key types of protection — dwelling, other structures, personal property and liability coverage. Not all policies are alike, and it's important to remember that coverage limits and deductibles may apply.

DWELLING COVERAGE

If your home is damaged, dwelling coverage may help pay to repair or rebuild the home. Some of the risks that are typically covered include:

FIRE & SMOKE **WIND** **LIGHTNING STRIKES** **HAIL**

OTHER STRUCTURES COVERAGE

Other structures coverage may help pay to repair or replace certain components that are not attached to your home after a covered loss. This coverage may extend to items such as:

A SHED **A DETACHED GARAGE** **A FENCE**

PERSONAL PROPERTY COVERAGE

Personal property coverage may help reimburse you for the value of your belongings or pay to replace your belongings after a covered loss. Examples of what personal property coverage may help protect include:

FURNITURE **ELECTRONICS** **CLOTHING**

LIABILITY COVERAGE

No matter how careful you are, accidents can happen. Liability coverage may help pay for costs resulting from an injury to someone else or damage to their property if you are found liable. For instance, liability protection may help cover:

A GUEST'S MEDICAL BILLS **YOUR LEGAL EXPENSES IF SUED** **AN INJURED PARTY'S LOST WAGES** **COSTS OF REPAIRING DAMAGE YOU ACCIDENTALLY CAUSED TO SOMEONE ELSE'S PROPERTY**

Allstate You're in good hands. Contact a local Allstate agent for an insurance quote or for help reviewing or adjusting your existing coverages. www.allstate.com/tools-and-resources

Equifax: what could be covered?

Cyber Coverage	% of Products Offering Coverage
Breach of Privacy	92%
Data & Software Loss	81%
Incident Response Costs	81%
Cyber Extortion	73%
Business Interruption	69%
Multi-media Liabilities (Defamation & disparagement)	65%
Regulatory & Defense	62%
Reputation Damage	46%
Network Services Failure Liabilities	42%
Contingent Business Interruption	33%
Liability - Technology Errors & Omissions	27%
Liability - Professional Services Errors & Omissions	23%
Financial Theft & Fraud	23%
Intellectual Property (IP) Theft	23%
Physical asset damage	19%
Death & Bodily Injury	15%
Cyber Terrorism	12%
Liability - Directors & Officers	13%
Liability - Products & Operations	8%
Environmental damage	4%

Source: Managing Cyber Insurance Accumulation Risk (2016) Cambridge Centre for Risk Studies, RMS

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