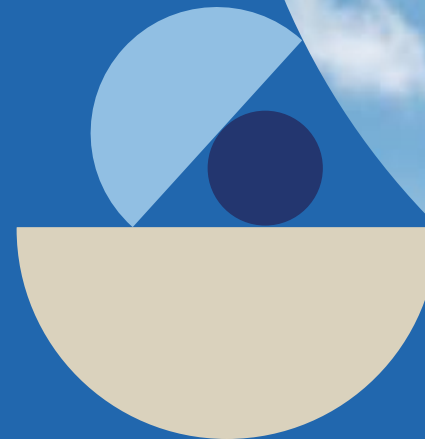# Parametric Insurance: From need to solution

CAS RPM
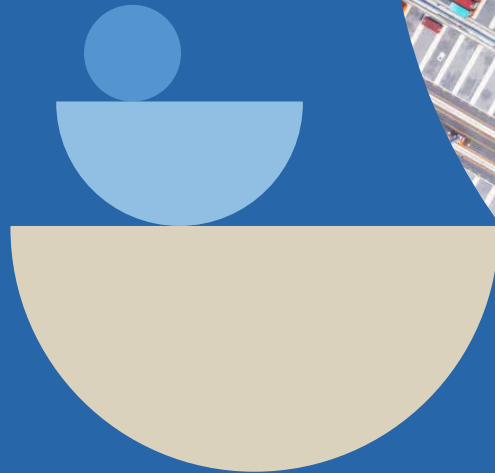
March 2022
Jonathan Charak FCAS MAAA CPL
Zurich North America

Agenda

1. Need to be **customer centric** when developing solutions

2. What is the **insurance protection gap**?

3. **Quick overview** of parametric insurance

4. Product Development

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Customer centric

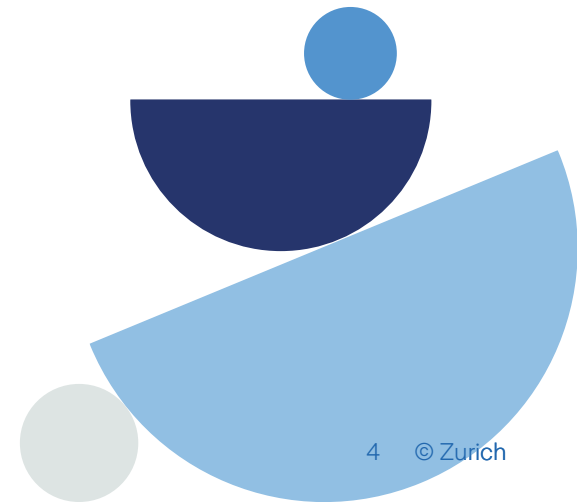# Customer-led solutions are needed in all industries

Developers need to build a home a realtor wants to sell and a future homeowner wants to buy

Insurers need to develop insurance propositions that our distribution partners can sell (able to explain the value proposition) and customers want as part of their complete risk management strategy

Insurance product development is a long process …

… need to ensure we are solving for a customer's needs

Identify and understand the world's emerging and evolving risks and their impacts to society and our customers

Ensure customer-led solutions are created that truly solve pain points for our customers

We pull together teams across multiple functional areas to ensure development of well thought out insurance propositions
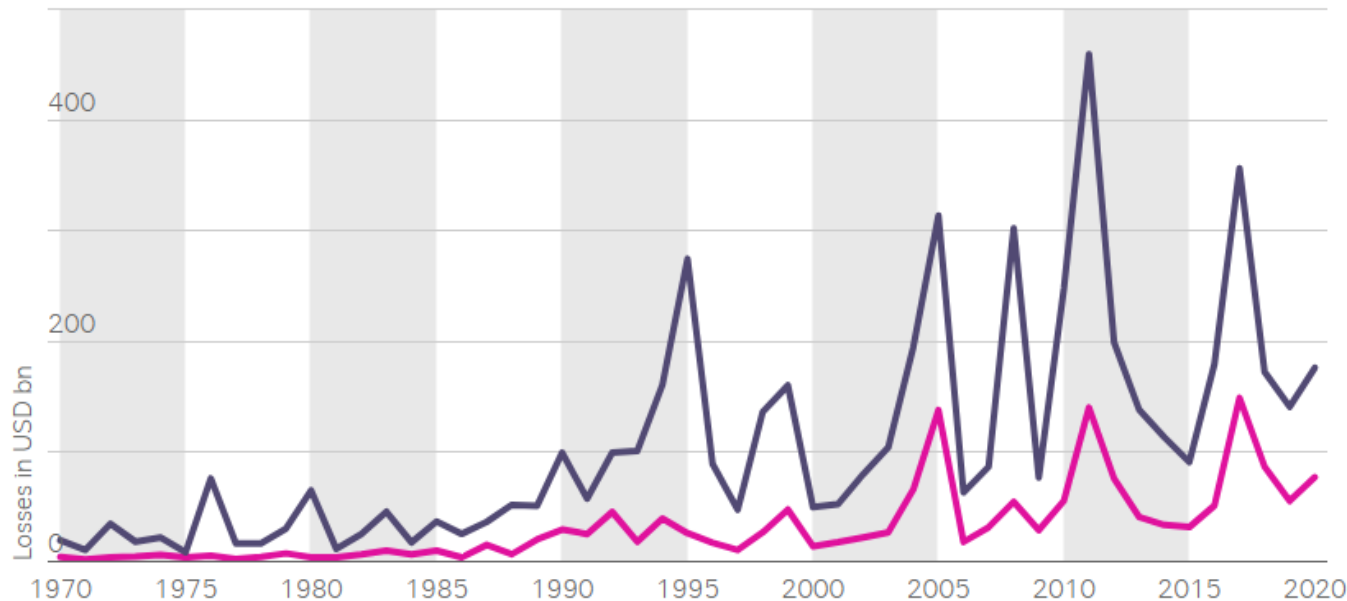
Insurance protection gap
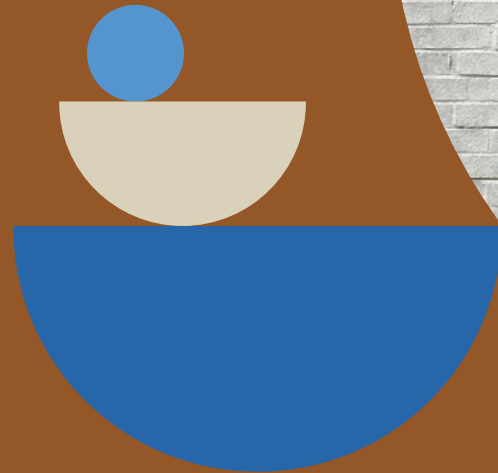
Further the insurance industry has a 'protection gap'…

… parametric insurance is part of the solution to narrow the protection gap

Natural catastrophe losses 1970-2020 (in USD billions)

Data set

● Natural catastrophes (insured)   ● Natural catastrophes (total)
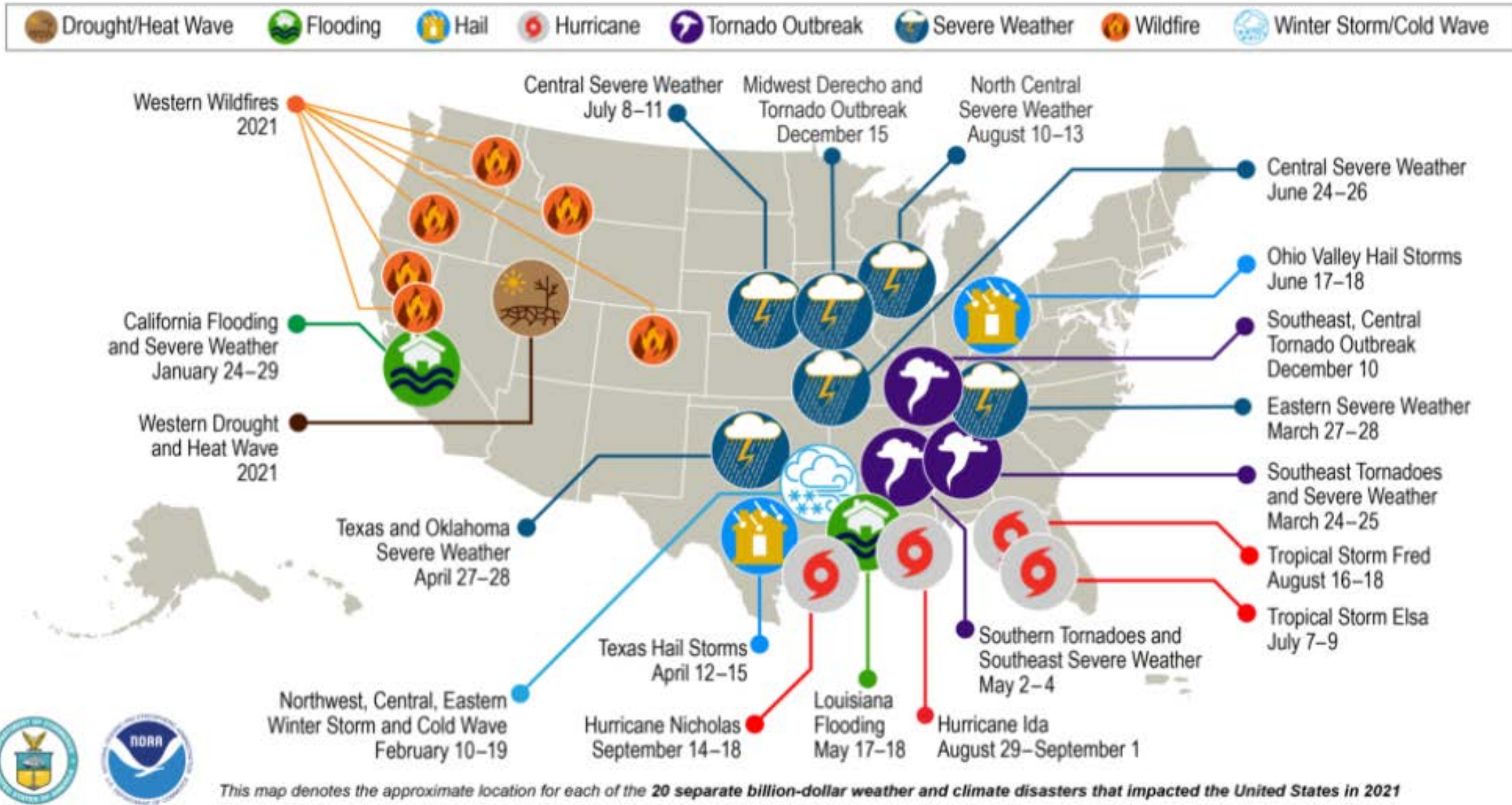
Comments

Total (economic) loss is larger than insured loss, difference driven by:

- No available insurance product

- Current products too expensive in eye of insured

- Lack of compelling insurance offerings

- Customer choice not to purchase

Weather and climate disasters more frequent, varied and costly

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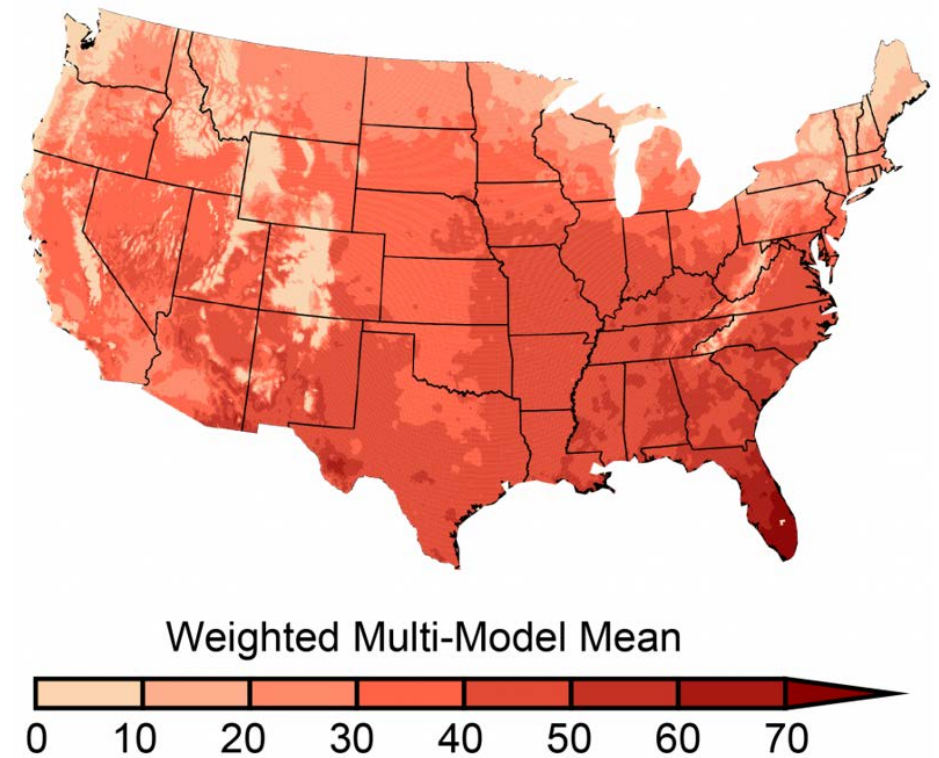U.S. 2021 Billion-Dollar Weather and Climate Disasters

Drought/Heat Wave · Flooding · Hail · Hurricane · Tornado Outbreak · Severe Weather · Wildfire · Winter Storm/Cold Wave

Western Wildfires 2021

Central Severe Weather July 8–11

Midwest Derecho and Tornado Outbreak December 15

North Central Severe Weather August 10–13

Central Severe Weather June 24–26

Ohio Valley Hail Storms June 17–18

California Flooding and Severe Weather January 24–29

Southeast, Central Tornado Outbreak December 10

Western Drought and Heat Wave 2021

Eastern Severe Weather March 27–28

Southeast Tornadoes and Severe Weather March 24–25

Texas and Oklahoma Severe Weather April 27–28

Tropical Storm Fred August 16–18

Tropical Storm Elsa July 7–9

Texas Hail Storms April 12–15

Southern Tornadoes and Southeast Severe Weather May 2–4

Northwest, Central, Eastern Winter Storm and Cold Wave February 10–19

Hurricane Nicholas September 14–18

Louisiana Flooding May 17–18

Hurricane Ida August 29–September 1

This map denotes the approximate location for each of the **20 separate billion-dollar weather and climate disasters that impacted the United States in 2021**

Weather and climate disasters more frequent, varied and costly

Observed change in very heavy precipitation[1], % pts

11%

12%

16%

37%

71%

5%

27%

-12%

33%

Change (%)

| <0 | 0-9 | 10-19 | 20-29 | 30-39 | 40+ |
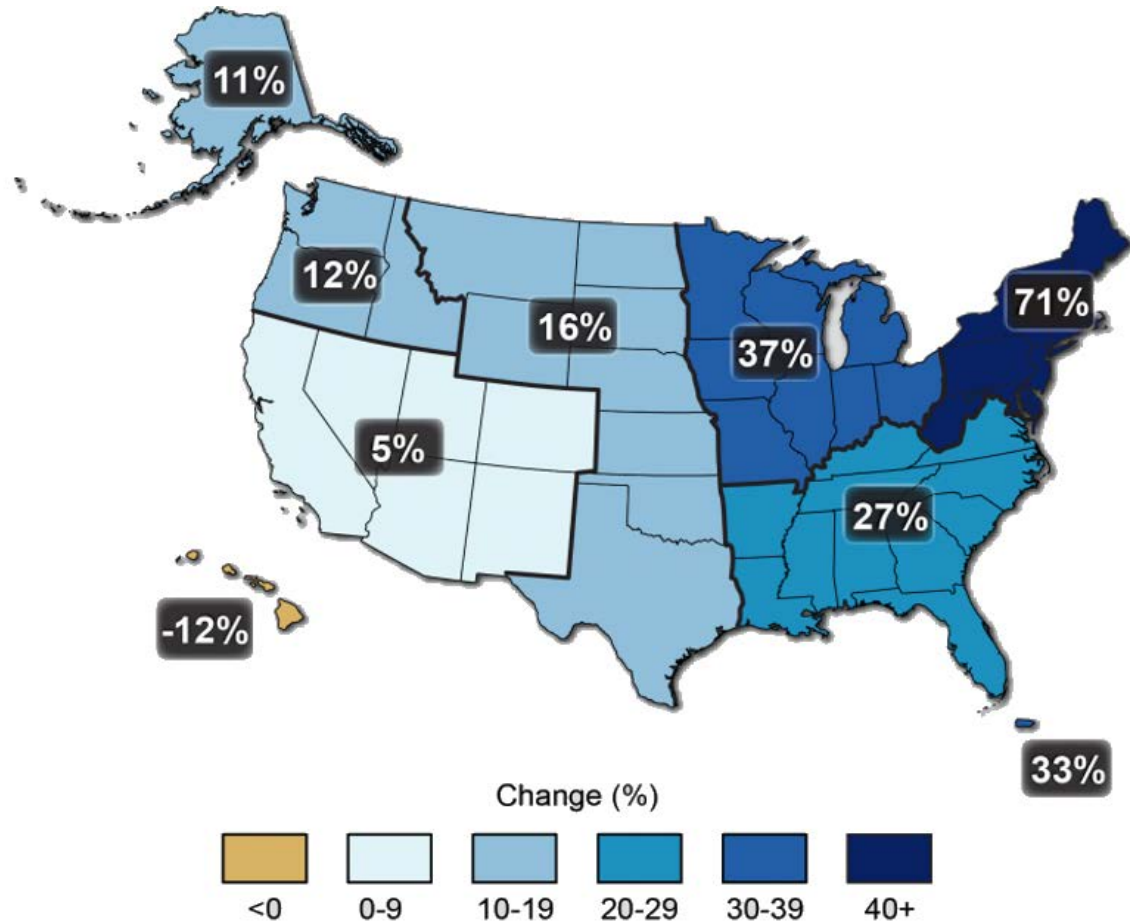
Projected change in number of days above 90°F
Mid-21st Century[2], # count

Weighted Multi-Model Mean

0 10 20 30 40 50 60 70

Quick overview

What is parametric insurance?
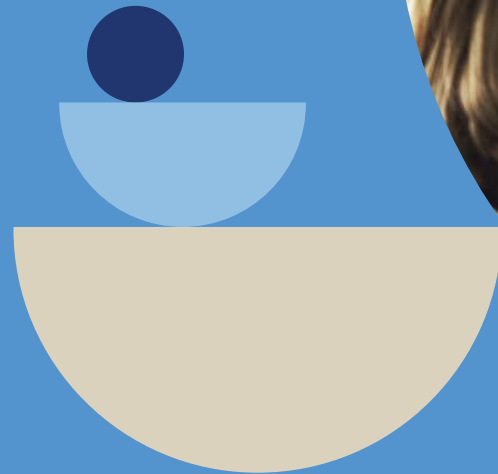
What is being covered?

- Predetermined event, often weather or geological
- Event highly correlated to a financial loss
- Does not require physical damage to provide claim payment for financial loss; non-damage business interruption

How are prices set?

- Based on probability of an event occurring, as well as agreed upon payment once the event occurs
- Geographic location and coverage-period dependent

How are claims paid?

- If the specified conditions occur (trigger is met), claim is paid rapidly without typical delays caused by extensive loss adjustment

The parametric methodology enables the creation of very transparent and automated products

If you pay me **X**

In case the event Y happens **Y**

I pay you **Z**

Premium

u/w personalised and automated

Trigger event

Fully transparent and undisputable by anyone

Compensation

Pre-determined and automated

The **payment is not related to the 'amount of loss'**, it is predetermined and solely linked to the 'trigger event'

Parametric solutions are based on a multitude of data that can be processed by a single engine
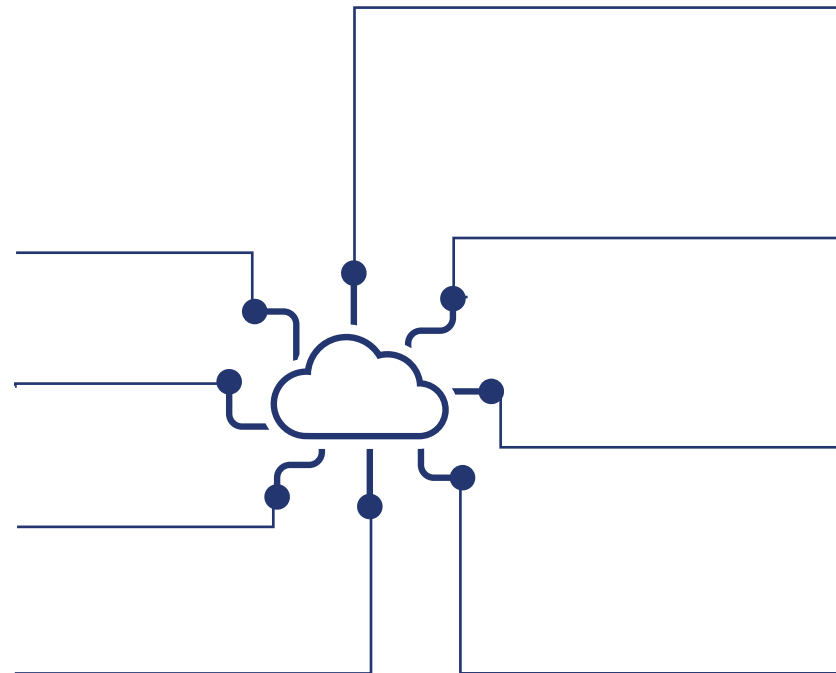
It's enabled by data…

The **exponential growth of data** combined with **new data processing technologies** could facilitate the adoption of parametric across the main product lines in commercial and retail.
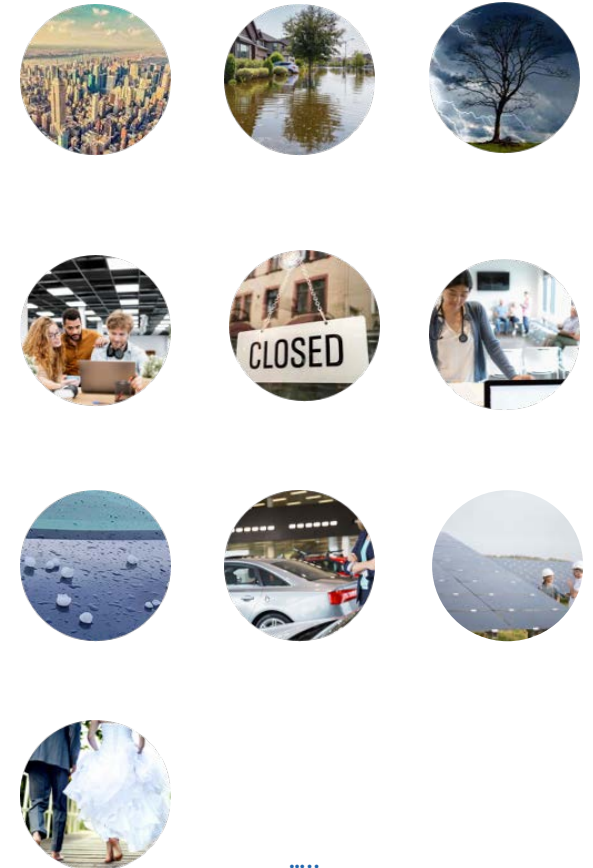
Type of Data Sets

Enhanced weather data

Customer data

Social media data

Booking systems data

Airport and traffic data

Cloud & cyber data

Social media data

Credit card transactions

IoT devices

Telematics data

Smart cities and infrastructures

…Calculations and statistical models…

…allowing the delivery of different use cases

.….

Current examples of parametric insurance products
Three main 'categories'

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Catastrophes

- Overall, the most common parametric proposition in the market, provides cat only cover that supplements/replaces some portion of a standard property cover

Weather-related (downwind impact)

- Offerings in this category generally create a newer category of insurance, non-damage business interruption (NDBI)
- These offerings generally expand/compliment traditional insurance

"Exotics"

- Uses many new technologies to provide coverage beyond catastrophes or weather
- Some examples include disgrace insurance via Twitter APIs, footfall traffic, and even cyber offerings

The common denominator is verifiable and objective trigger that both the insurer and insured agree to measure an event

Caveats to consider regarding parametric insurance products

Need to claim loss

Parametric insurance should not be confused with a financial derivative

Indemnification limits

Insurers cannot over-indemnify a customer
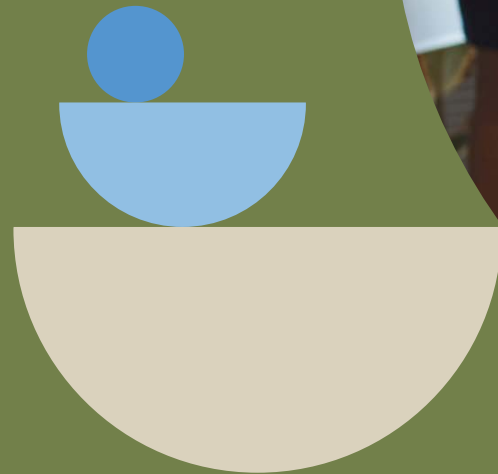
Cost of parametric insurance

Price of parametric insurance depends on the subject of the insurance and structuring

NDBI complements traditional insurance

Can be part of a well thought-out and sound risk management strategy

Product development

In January 2021, Zurich North America announced our 1st parametric insurance proposition to the market

Zurich North America launches new parametric insurance product

by Ryan Smith
07 Jan 2021

SHARE

Zurich North America has announced the launch of a weather parametric insurance product. The insurance will cover weather-related construction delays not covered by traditional builders' risk insurance policies.

Traditional builders risk policies offer protection for financial loss related to weather events, but only when those events cause physical loss or damage to a product. Zurich's construction weather parametric policy does not require physical loss or damage for a claim to be paid.

Rather, payment is based on predetermined weather events occurring in the project's location, such as extreme rain, wind, or temperatures – any of which can cause project delays that result in financial loss, even when the project is not physically damaged.

How did Zurich get here?

Market Research

Gain preliminary leadership approval

Put together team for ideation sessions

Review/vet ideas → take ideas to market facing leadership

Ensure skills to develop product are in house or acquirable

Present candidates / business case for approval

Pull together updated team to develop product

Engage with our Product Development project managers

We needed to understand how we will assess opportunities

Modelling Ability

- Reliance on **internal data**
- **New data sources**
- Ability to **diversify portfolio** (e.g. Hurricane and EQ will lead to increased accumulation risks)

Market Opportunity

- How big is the market (or industry we're targeting)?
- How big is our foothold in the market (or industry)?
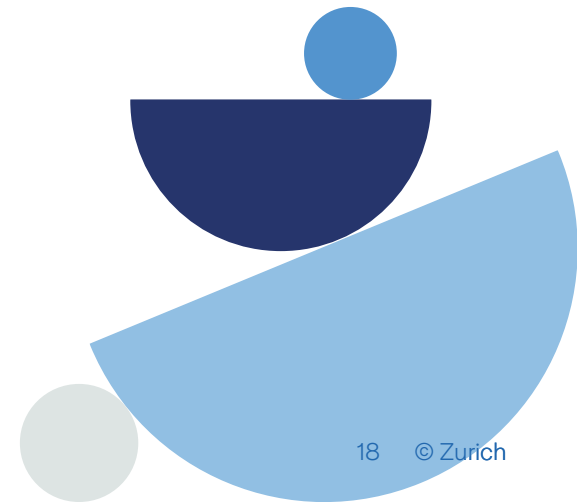
BU / SBU Appetite

- Does this fall within appetite

Distribution Model

- Are brokers excited to distribute this product?
- Would Program Administrators be able to distribute this product?

Analysis across these four dimensions will lead to a proposed product

Bold experimentation allows for strategic problem solving in any industry

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Bold experimentation in insurance used to develop insurance solutions to close the coverage gap

Use bold experimentation to solve your customer's problem

Thank you,

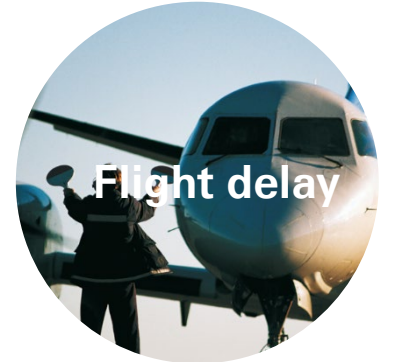Jonathan.Charak@ZurichNA.com

Parametric Insurance Solutions

Swiss Re

Parametric Insurance

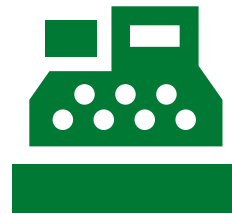Settles on **pre-agreed**, **simple measure** *("parameter" or "index")*

Pays out pre-defined amount when **triggering event occurs**

Parametric insurance can covers many perils and serve different customer needs

Earthquake

Tropical Cyclone/ Hurricane

Drought (Agriculture)

Flood*

Lack of wind / sun / water for renewable energies

Flight delay

Emergency cash
Quick payment to cover immediate expenses such as evacuation, food, transportation.

(Non-damage) business interruption
Quick payment to cover reduced revenue due to damage in nearby locations.

*in development

Swiss Re's Parametric Insurance Offering

Parametric Insurance: type of insurance...

... that settles on a pre-agreed, objective measure **("parameter" / "index")**

... and pays out **a pre-defined amount** when triggering event occurs

Risk Knowledge + Parametric Expertise + Modular IT Platform

Risk assessment

- Risk analysis based on location input
- Exposure visualization (CatNet API)
- Proprietary risk models (Cat Server API)

Risk taker

Tailored product design

- Index definition incl. double trigger functionalities
- Quoting and pricing
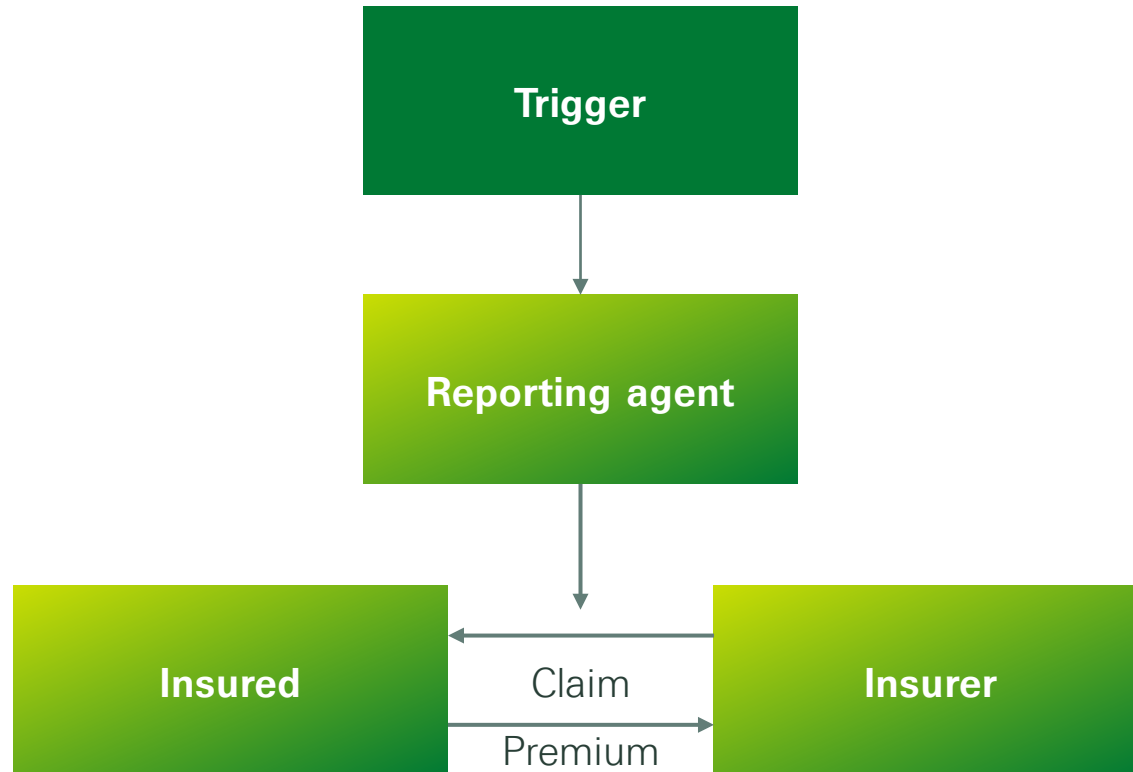- Combining parametric and indemnity insurance

Parametric capabilities

- Rapid Damage assessment

End-to-end solution from front-end to payment system

- Front-end for clients*
- Event tracking
- Automatic notification
- Proof of loss
- Automatic claims payment
- Policy administration

Swiss Re

How parametric insurance works

```
┌─────────────────────────┐
│                         │
│        Trigger          │
│                         │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│                         │
│    Reporting agent      │
│                         │
└─────────────────────────┘
             │
             ▼
┌──────────────┐      ◄──────   ┌──────────────┐
│              │      Claim     │              │
│   Insured    │                │   Insurer    │
│              │     Premium    │              │
└──────────────┘      ──────►   └──────────────┘
```

- **Parametric insurance** is a type of insurance that settles on a pre-agreed, simple measure (the "parameter" or "index").
- Pay out depends on the **occurrence of a triggering event**, regardless of the actual loss.

- An **independent third party** (e.g. USGS for earthquake) determines the intensity of the event and hence the impact on the claim.

- The insured purchases a **maximum pay out cover** from the insurer. The premium depends on the chosen limit as well as exposure of the insured.
- The pay out on a parametric product is unlikely to be exactly equal to the financial loss of an insured and the difference is known as **"basis risk"**.

Fast, flexible and affordable insurance

Fast access to cash & flexible usage

Transparent & simple product

Customizable product

- **What is parametric insurance best used for?**

- As emergency cash relief which is payed out immediately

- When traditional insurance is not accessible or affordable

- As complement to traditional insurance

Advantages and challenges: Fast and flexible payouts but increased basis risk

Advantages

- **Fast** access to cash
- Otherwise **uninsurable** risks can be insured (e.g. emergency costs, business interruption)
- **Flexible** use of the funds
- **Affordable**: No claims process and low limits
- **Transparency** for insurer and insured
- Hot topic: Parametric insurance is a new trend in innovative insurance products

Challenges

- **Basis risk** (insurance payout may deviate from actual loss)
- Strong distribution channel needed
- Approval by regulator
- Need to educate consumer and client
- Need for objective and accurately **measured historical data**

Building the future of parametric insurance: Multi-trigger

1st Trigger

2nd Trigger / Proof of loss

strong trigger

Official EQ/TC footprint

low basis risk

Official evacuation order

Flood event footprint

high basis risk

Excess rainfall

weak trigger

Sensors

Drones

Traffic data

Transaction data

Satellite imagery

Image recognition with geo/timestamp
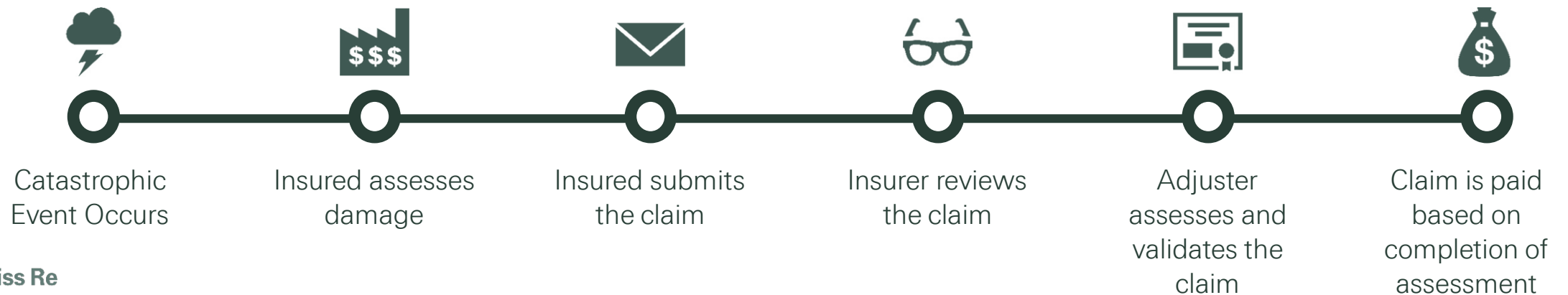
Social media

Crowd sourcing platforms

Text message

Sophisticated 2nd trigger to automatically provide proof of loss

Exploring partnerships with data providers (traditional & alternative)

Rapid loss estimation

Parametric Insurance: transparent, quick − digital markets ready

Parametric insurance

Catastrophic Event Occurs — 3rd Party verifies intensity — Payment issued in as little as 30 days — Confirm proof of loss within 1 year

Indemnity based insurance

Catastrophic Event Occurs — Insured assesses damage — Insured submits the claim — Insurer reviews the claim — Adjuster assesses and validates the claim — Claim is paid based on completion of assessment

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Parametric insurance: costing and pricing

Costing				Pricing		
Frequency of payments	Amount of payment	=	Expected Loss (cost)	+ variable cost loadings	=	Final Price
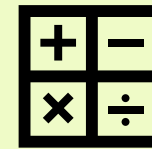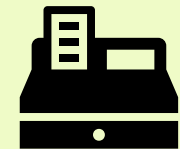
- A parametric insurance solution needs to be based on a trigger that is designed so that the payments received under the solution are as close as possible to the actual incurred losses, or the loss amounts the client expects to receive under the event described by the trigger.

- As a parametric product always needs to rely on a proxy for the actual loss, not looking at the actual incurred loss, payments under a parametric product can be higher or lower than the actual loss. This deviation is called "basis risk". Basis risk can be minimized by thoughtful structuring but never be eliminated.

- Basis risk is the single most important "challenge " of parametric products, and needs explicit client information

The role of the data provider: critical for parametric deals

Data plays a key role in all forms of insurance. For parametric solutions data, and data provision by a data provider comes in various forms. The data provider, can but must not take any or all roles

Costing (structuring) Agent

- Provides the actual parametric structure, setting the trigger level
- Ideally the data and method used for the solution is available in a continent fashion for >10 years.
  - Yes - Data can be used for costing.
  - No - costing needs to rely on a method reasonably close to the method used for trigger reporting.
- Role typically taken by specialized teams in (re)insurance, brokerage firms, risk modelling firms
- Very close interaction with end customer

Calculation Agent

- In many cases the trigger is more complex that the reporting of a simple. e.g., physical variable such as temperature, or mm of rainfall. Also, such information can typically not be taken from a general publicly available website.
- The legally binding trigger value(s) are provided by the calculation agent

- *Example: Multiplying flood water depth at a specific location (reporting agent) with an exposure index value to produce a calculated index trigger value (calculation agent)*

Reporting Agent

- Calculation and reporting agent can but must not be the same.
- The reporting agent issues the legally binding report holding the values of the trigger vent provided by the calculation agent, or the values needed by the calculation agent

- *Example: USGS offers it's shake map after an earthquake (reporting agent). This data is used by a risk consultant to calculate weighted intensity values at a defined location to determine the trigger value (calculation agent)*

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Examples of typical data providers (selection for illustration purposes only)
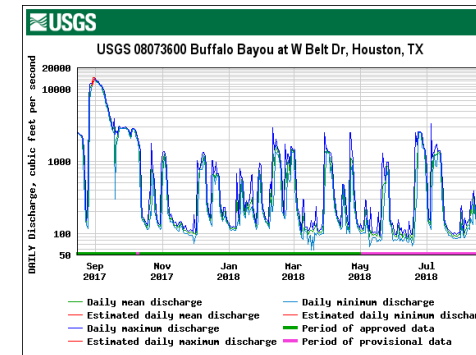
Wind Speed Intensity
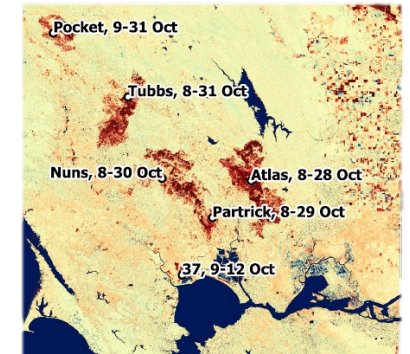NOAA Recon Hurricane Flights
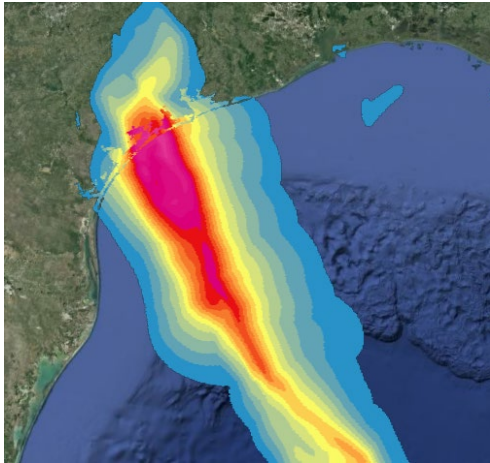
Ground Shaking Intensity
USGS Shake Map
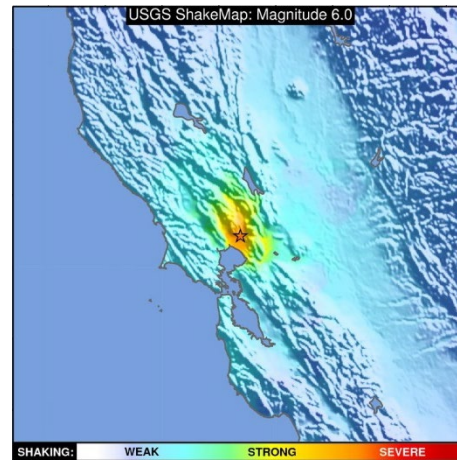
Excessive Rain & Flooding
USGS Streamflow Conditions

Wildfire Burned Area
ESA Satellite Images

- Data providers need to be reliable, transparent in their services and ready to take part in a legal agreement

- Data must be consistent over time also forward looking, at least to cover the time of underlying, supported agreements

- Data providers must offer a fallback option in case services fail to capture "an event"

- Literally anything that can be measured reliably, consistently over time and is shielded from unwanted natural or man-made manipulation can be used as a trigger for a parametric product

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# Parametric hurricane product: "Cat-in-the-box" product design

- **Triggers** if a hurricane with a certain windspeed (x min sustained) enters the defined geometric shape.

- **Shape and size** of box: circle, rectangle, polygon or combinations
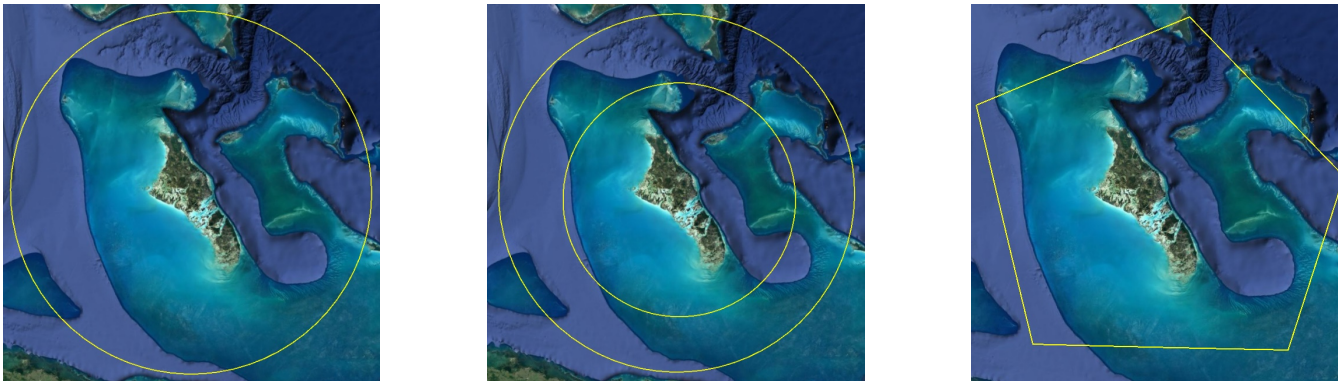
- **Reporting Agencies (examples)**
  - North Atlantic & North Pacific: National Hurricane Center (NHC)
  - Global Disaster Alerting Coordination System (GDACS)
  - West Pacific: Japanese Meteorological Agency (JMA)
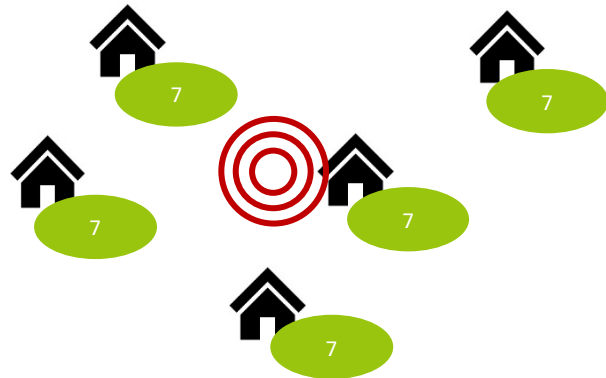
Interdependency of parameters

Hazard intensity

Premium

Potential payout

"Box size"
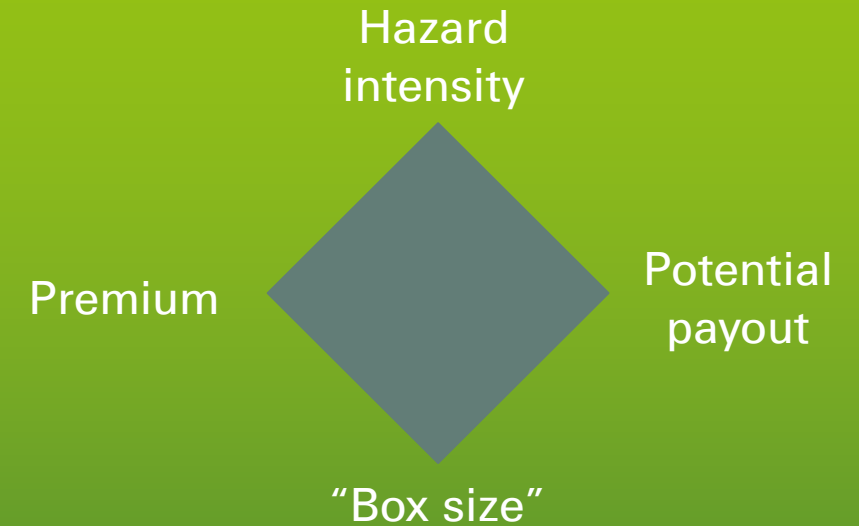
Payout structure: Stepped

| Hurricane Category	Stepped "in the money"	Stepped "Cat cover"
3	75%	0%
4	100%	50%
5	100%	100%

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Parametric earthquake product: Intensity based product design

- **Triggers** if the earthquake intensity at a insured location is above the predefined threshold.

- **Magnitude vs. Intensity**

While **Magnitude** indicates the earthquake's energy release it is the same at every location
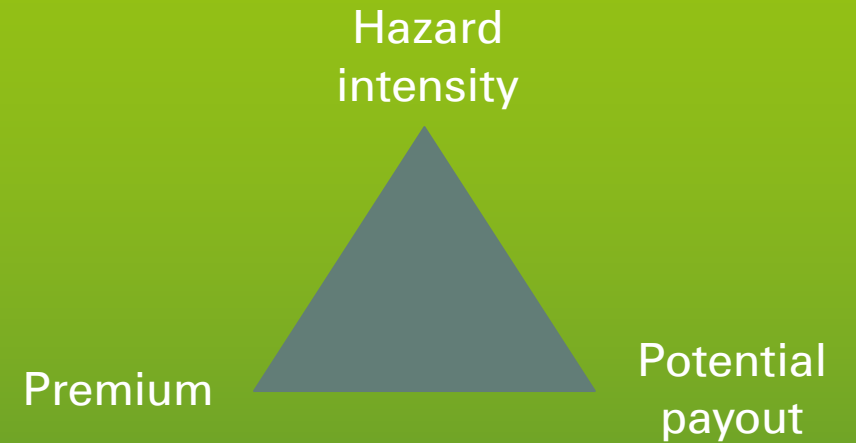
...**Intensity (PSA)** conveys the ground shaking at a given place in an earthquake
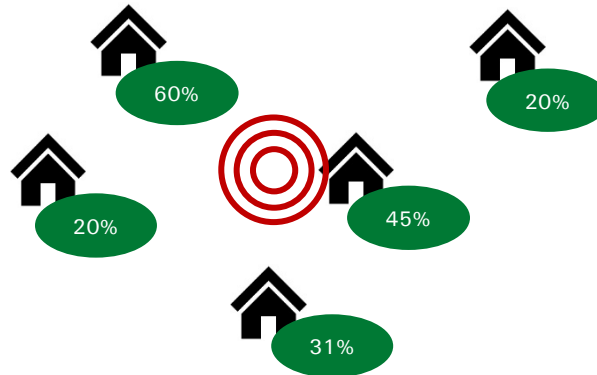
- **Reporting Agencies**
  - U.S. Geological Survey (USGS)
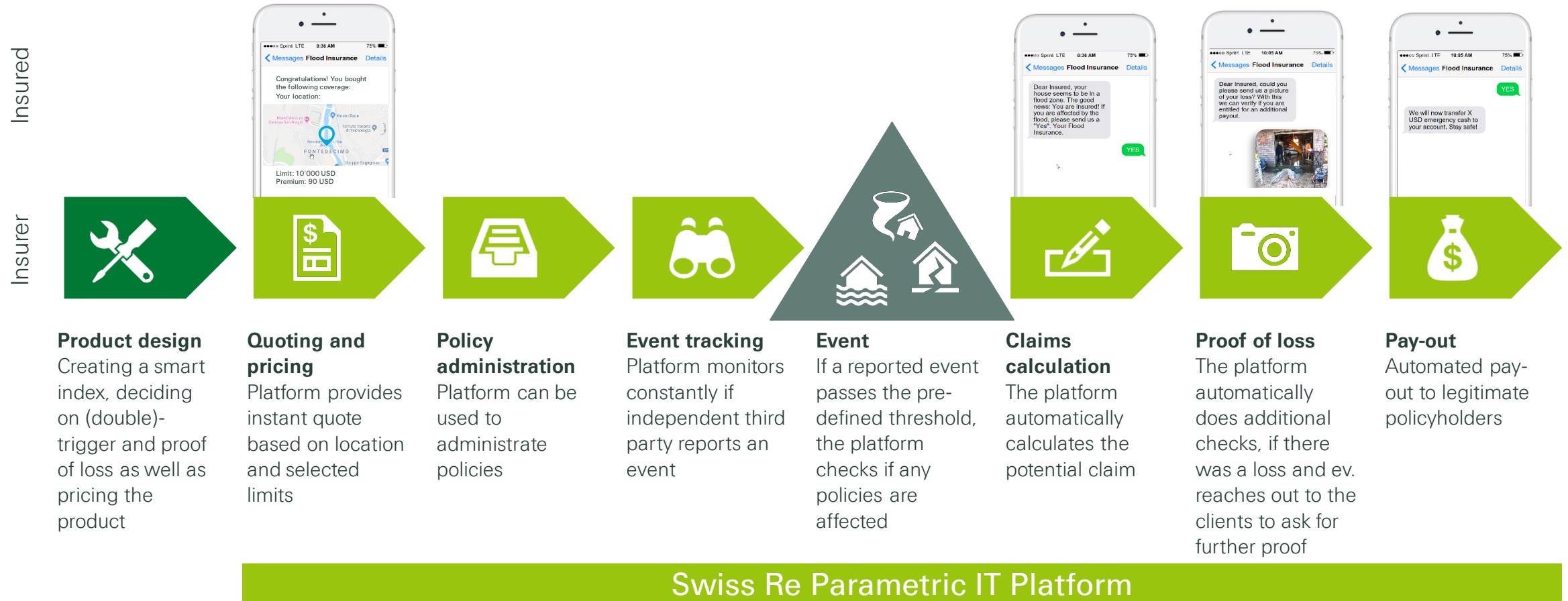
Interdependency of parameters

Hazard intensity

Premium

Potential payout

Payout structure: binary or stepped

Earthquake intensity	Binary	Stepped
X	0%	0%
X	0%	50%
X	100%	100%

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User journey parametric insurance:
Our sophisticated solution for the insurer makes the product simple for the insured

Insured

Insurer

Product design
Creating a smart index, deciding on (double)-trigger and proof of loss as well as pricing the product

Quoting and pricing
Platform provides instant quote based on location and selected limits

Policy administration
Platform can be used to administrate policies

Event tracking
Platform monitors constantly if independent third party reports an event

Event
If a reported event passes the pre-defined threshold, the platform checks if any policies are affected

Claims calculation
The platform automatically calculates the potential claim

Proof of loss
The platform automatically does additional checks, if there was a loss and ev. reaches out to the clients to ask for further proof

Pay-out
Automated pay-out to legitimate policyholders

Swiss Re Parametric IT Platform

Case Study 1: Digitalization of consumer journey and delivery of a parametric NatCat product in Latin America

The car

- Central American insurer
- Focused on product innovation and simplification with a view to closing NatCat protection gap

The challenge

- High-growth, dynamic market requiring fast turn-around times
- Operational inefficiencies pushing insurer to find improved distribution methods
- Needed an easy consumer journey and fast claims pay out
- Required regulatory sign-off

Solution

- End-to-end parametric pricing platform including quote, event tracking and policy admin
- Flexible product design, distributed via traditional and non-traditional channels
- Streamlined processes allow fast review and acceptance of parametric products into RI facility

The result

End-to-end parametric pricing platform offered to clients in +10 countries

New

Comprehensive solution including IT, product design, innovative distribution

Go live in under 3 months, saving development costs now and future running costs

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Case Study 2: Parametric wind insurance for SMEs in the US

The carrier

- Global insurance company
- wanted to offer a fully automated parametric hurricane product for commercial clients in the US

The challenge

- Time-consuming quoting, event tracking and claims
- Front-end needed for brokers to sell parametric insurance
- Meeting needs of digital generation

Solution

- IT platform setup & customization including Policy administration, event tracking – incl. integration of new reporting agent, claims payment
  - Accounting & reporting
  - Portfolio steering

The result

- Product launch within 6 months
- Quotes sent out in less than 1 second
- Claims settlement process 67% faster
- First policies are sold - access to new risk pools

Fast

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Any questions?

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Thank you!

Contact us

Daniel H Seyyedi, PhD
VP of P&C Solutions
Hojjat_Seyyedi@swissre.com

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