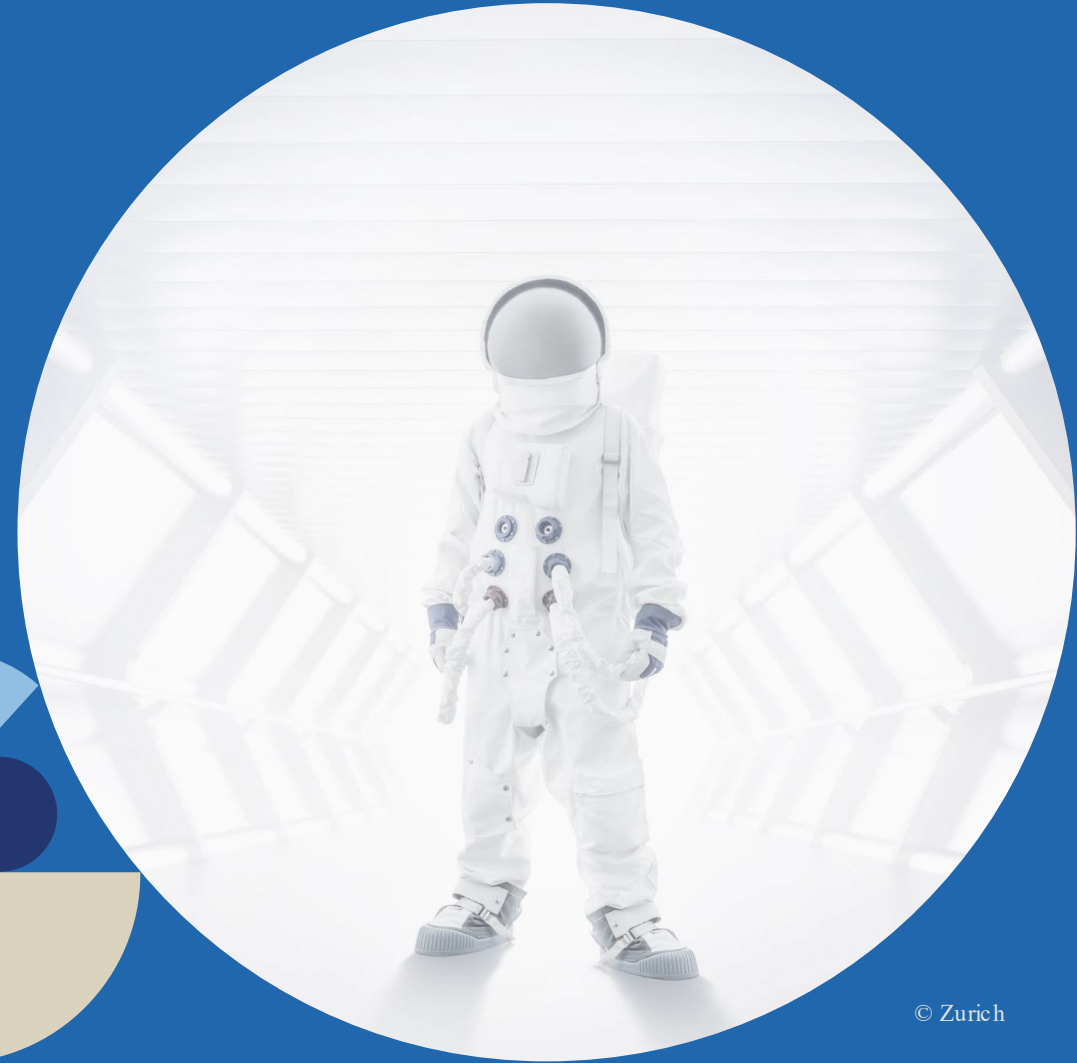
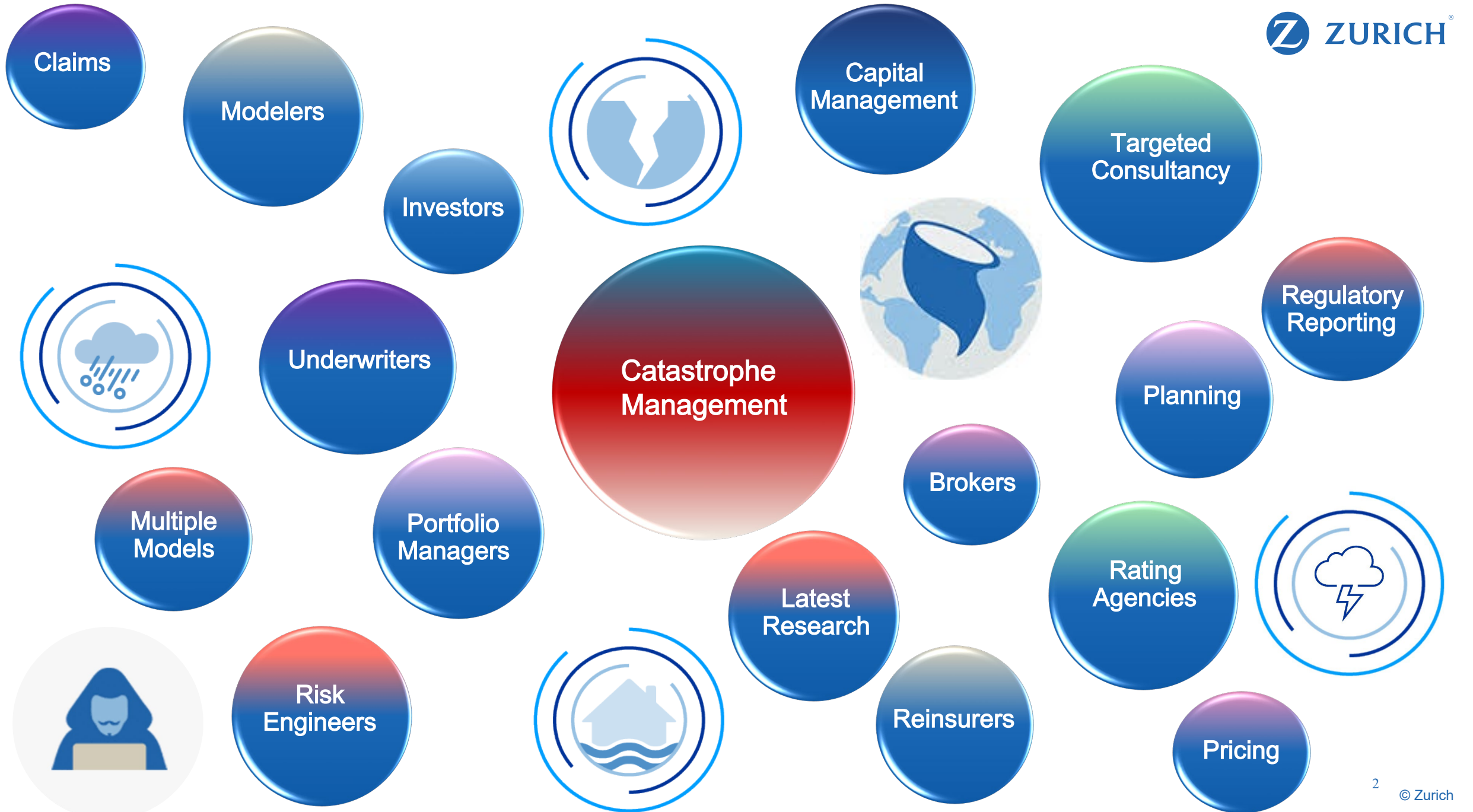


Cat manager skills: past, present, future

Evi Giannakaki
paraskevi.giannakaki@zurich.com

Roland Schöbi
roland.schoebi@zurich.com





slido

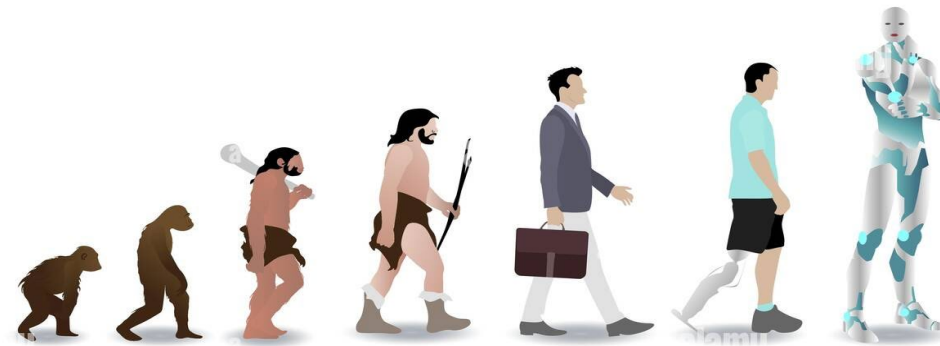


What is the most important skill of a cat manager?

ⓘ Start presenting to display the poll results on this slide.

Overview

- The past – where we are coming from
- The present – what we are doing now
- The future – where we want to get
- Learnings and wrap-up



The past



[Royalty-free Images, Photo Stock, Video & Music | Depositphotos](#)

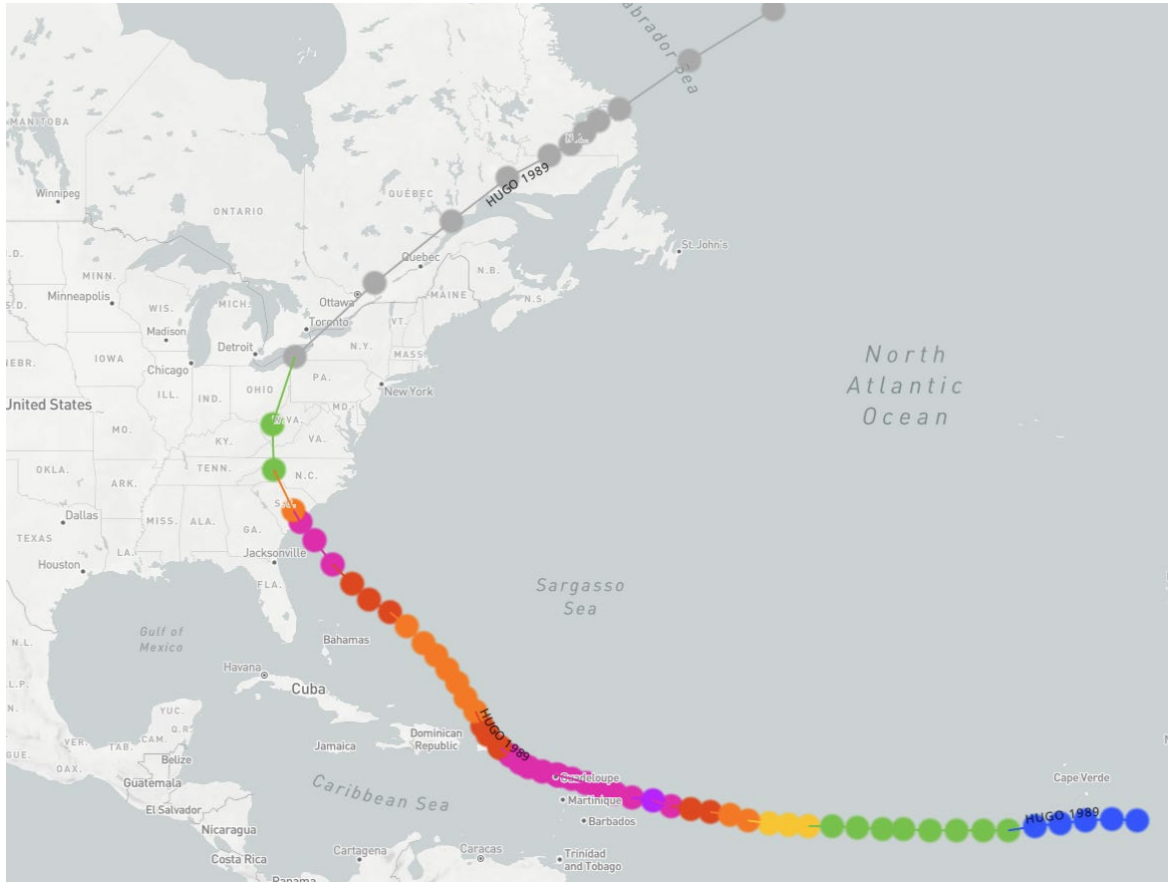
Although Cat models were available from late 1980s, insurance and reinsurance industry was not using Cat Models and the main reason was that the models predicted potential losses from theoretical events which were far greater than anything observed historically!

(Re)insurers used rough rules of thumb based on premiums to estimate potential losses.

Cat models within insurance industry

A series of large catastrophes accelerated the development of Cat models and made (re)insurance industry to reconsider

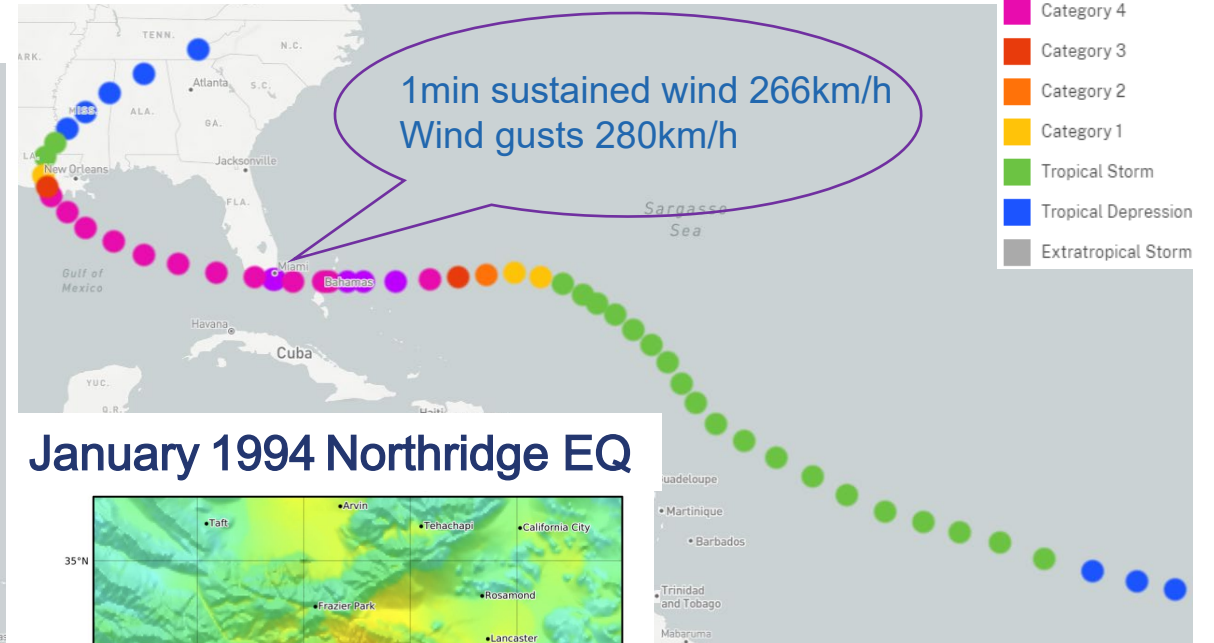
September 1989 Hurricane Hugo



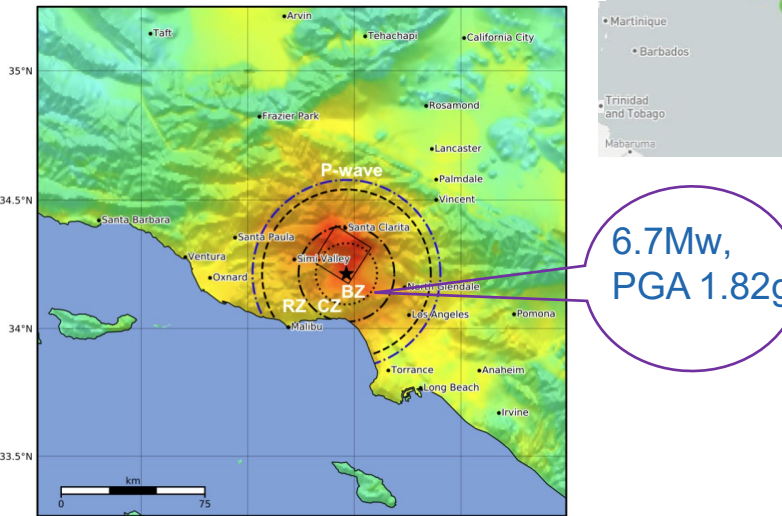
[Historical Hurricane Tracks \(noaa.gov\)](https://www.noaa.gov)

<https://www.usgs.gov/media/images/1994-m67-northridge-ca-shakemap>

August 1992 Hurricane Andrew



January 1994 Northridge EQ



SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
DAMAGE	None	None	Very light	Light	Moderate	Moderate/heavy	Heavy	Very heavy	
PGA(%g)	<0.05	0.3	2.76	6.2	11.5	21.5	40.1	74.7	>139
PGV(cm/s)	<0.02	0.13	1.41	4.65	9.64	20	41.4	85.8	>178
INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X

Scale based on Worden et al. (2012). Version 1: Processed 2018-11-28T21:10:02Z
 Δ Seismic Instrument ○ Macroseismic Observation ★ Epicenter □ Rupture

Hurricane Andrew



In total, Andrew destroyed more than 63,500 houses, damaged more than 124,000 others, caused \$27.3 billion in damage (equivalent to \$57 billion in 2022) and left 65 people dead.



[Hurricane Andrew's Legacy: 'Like A Bomb' In Florida : NPR](#)

[Hurricane Andrew - Wikipedia](#)

Zurich's accumulation management journey

The distant past

1994-1997

Scenario based accumulation control

Focus on key peril regions based on RMS

Beginning of probabilistic modeling

Global approach with first exposure data standard

1998-2003

Formation of GCM with increasing efficiency, effectiveness and consistency

Significant extension of modeled scope

Multi-model approach

Zurich View-based Nat Cat recognizing model limitations (e.g. non-modeled)

2004-2014

2015-2022

Exposure data sourced from REDS
Man-made hot spots in REDS
AIM Scenario approach
Start of cyber and casualty cat modeling
Cat Risk Insights
Increased Cat R&D function

today

Increased Cat R&D function
Adding the option of in-house models
Increased model frequency thanks to automation
Exposure data validation using ML
Risk-based data quality guidance to countries
Consulting cat portfolio management and cat planning

future

Model automation process, increase modeling frequency and expand to more LOBs
Unique view of risk across underwriting to portfolio optimization from the same cat models
Increased model flexibility and transparency
...???

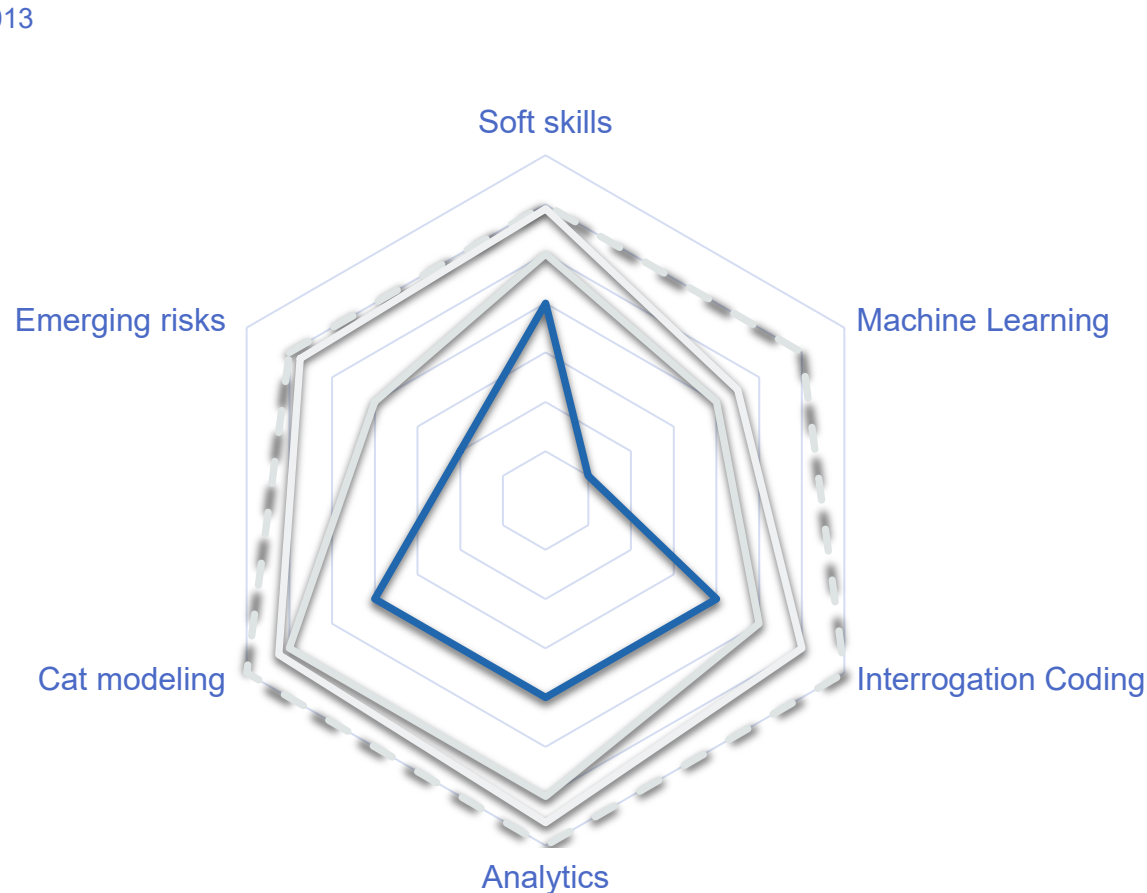
The distant past

Before 2000

- Small teams putting a lot of effort on collecting and cleansing data
- Typical IT landscape with black box vendor models implemented on premise, manual execution
- Spending a lot of time on trying to run the model. No time for results analysis and consultancy to the countries
- Repetitive work
- Low resolution data
- Table based analysis → Excel as reporting tool



[Memes — The Stamou Lab](#)

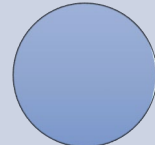
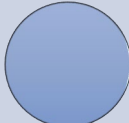


- **Cat modelling:** understand how Cat models work, interpret and explain the model outputs
- **Soft skills** for communicating the results to stakeholders and explain complex results in a simple way
- **Machine learning:** understand how ML algorithms work, be able to apply these algorithms in a relevant content.
- **Analytics** skills for several functions like portfolio performance analysis
- **Emerging risks:** be able to identify and manage perils that we did not considered previously
- **Interrogation Coding:** knowledge of a programming language, be able to interrogate existing code

Zurich's accumulation management journey

The recent past

2015-2022
Exposure data sourced from Risk Exposure Data Store (REDS)
Man-made hot spots in REDS
Emerging Risk Assessment
Start of cyber and casualty cat modeling
Cat Risk Insights (CRI)
Increased Cat R&D function



future

Model automation process, increase modeling frequency and expand to more LOBs
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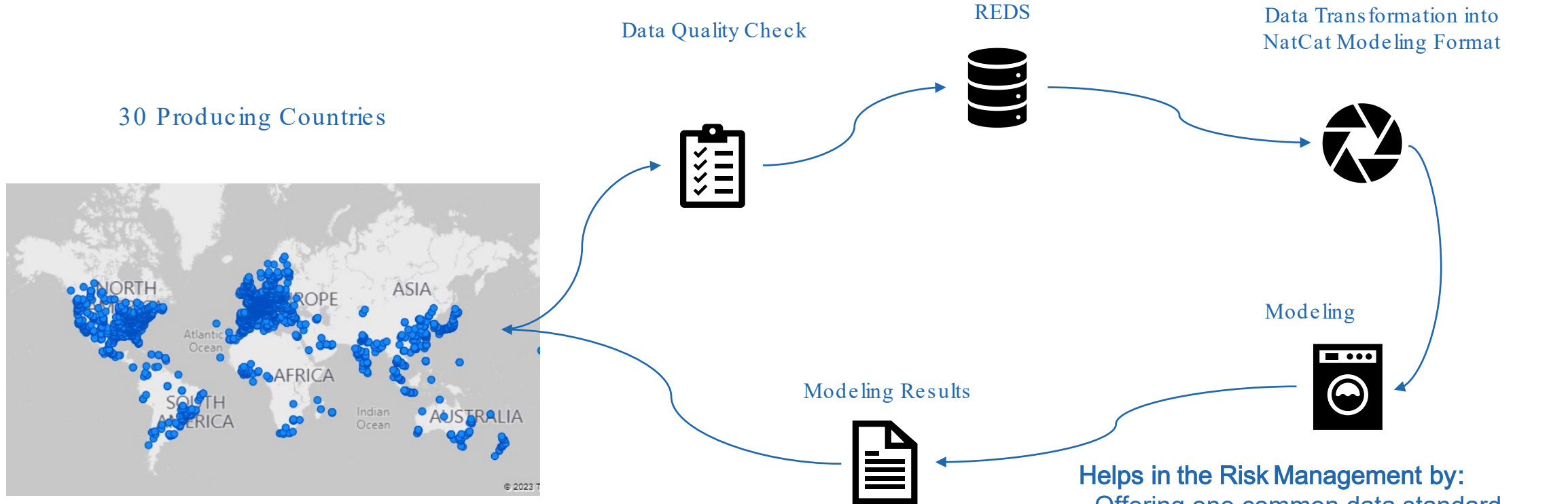
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2004 -2014
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Multi-model approach
Significant extension of modeled scope
Formation of a Centralized Cat team with increasing efficiency, effectiveness and consistency

1994-1997
Scenario based accumulation control

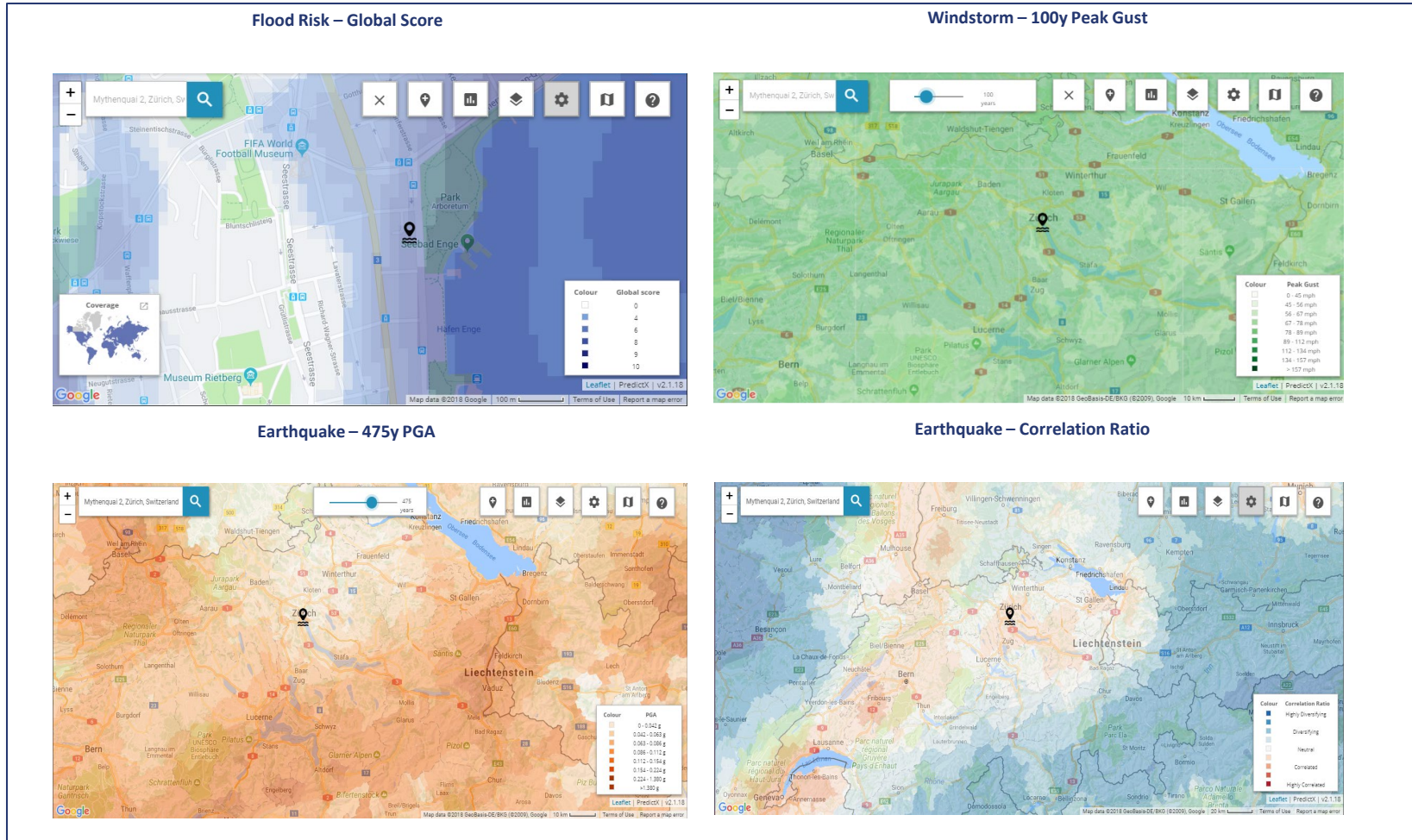




- 263 Interfaces
- Most of them Delivered Monthly (fully automated)
- 15 Million risks
- Multi-Lob
- Standard Exposure Format
- Data Quality Gate and Delivery Control (Sign Off)

Helps in the Risk Management by:

- Offering one common data standard
- Providing a Framework for Accumulation Governance (Data quality accountability by countries)
- Help control data quality
- Support Accumulation modeling and reporting
- Support Strategies
- Support risk assessment for New Business / Renewal Stacking & Clashing and Catastrophe modeling



Cat Risk Insights Platform

- Global integrated catastrophe risk insights including 12 hazards
- Accumulation and capital metrics

The recent past

How did the cat management in Zurich shift between 2004 and 2022

- SaaS, cloud hosting, pipelining, APIs and micro-services
- Risk Exposure Data Store (REDS)
- Cat Risk Insights (CRI)
- Machine learning current risk
- New Nat-cat perils
- New Man-made perils (cyber, casualty)
- Higher resolution model and data
- Black box to grey box
- Beginning of cat risk consultants

Tasks are shifting

#1 Sitting On Tv

THEN

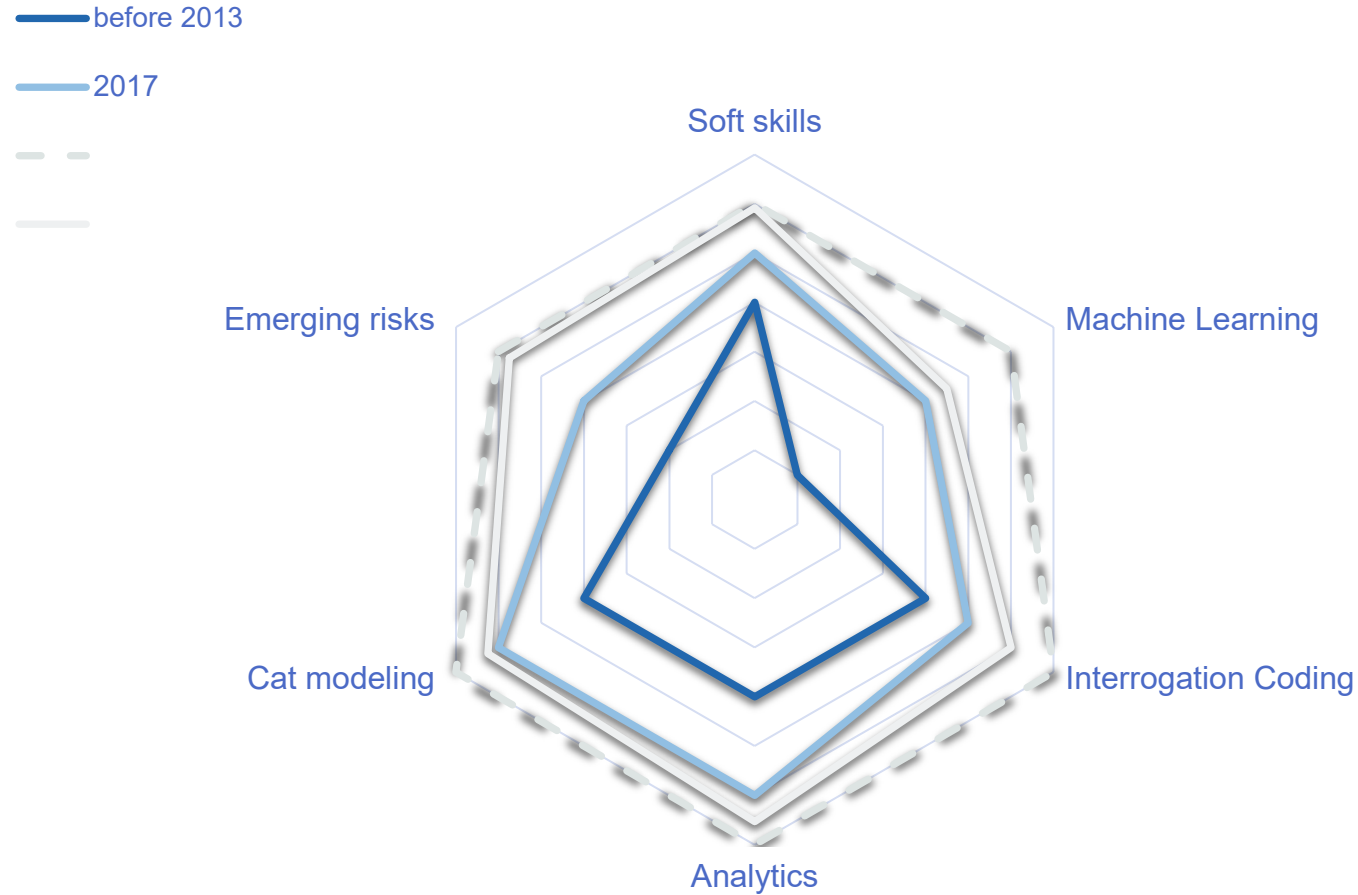


MEOW



<https://www.boredpanda.com>

Group Accumulation Management team skills through the last years



- Knowledge in catastrophe modelling.
- Strong statistical and analytical skills.
- Expert ability to translate academic research into applicable information leading to improved Cat risk assessment and management.
- Working experience in programming a high-level language like Matlab, R or Python.
- Experience in applying statistical analysis, machine learning, artificial intelligence and modeling of large data sets is desirable.
- Technical skills in a programming language like C, C++, C#, .Net, Java, etc. and database skills (SQL) are desirable.
- Expert ability to communicate complex results in a clear way to non-practitioners.
- Ability to work within a team physically located in different geographies.
- Highly self-reliant and committed personality with strong interpersonal, communication and networking skills.

The present – the transition phase?



Natural Catastrophe



Man-made Catastrophe



Zurich's **Accumulation Management Vision** proactively identifies *risk accumulations* and generates *risk insights* across lines of business and any loss scenarios, equipping underwriting and other functions to take appropriate action to *manage risk and improve profitability*.

We deliver *risk insights to customers* to help them reach their full potential.

This is achieved in a *timely, globally consistent and efficient* way, relying on *thought leadership, innovation and simple processes*.

Cyber Catastrophe



Casualty Catastrophe



Zurich's accumulation management journey

today

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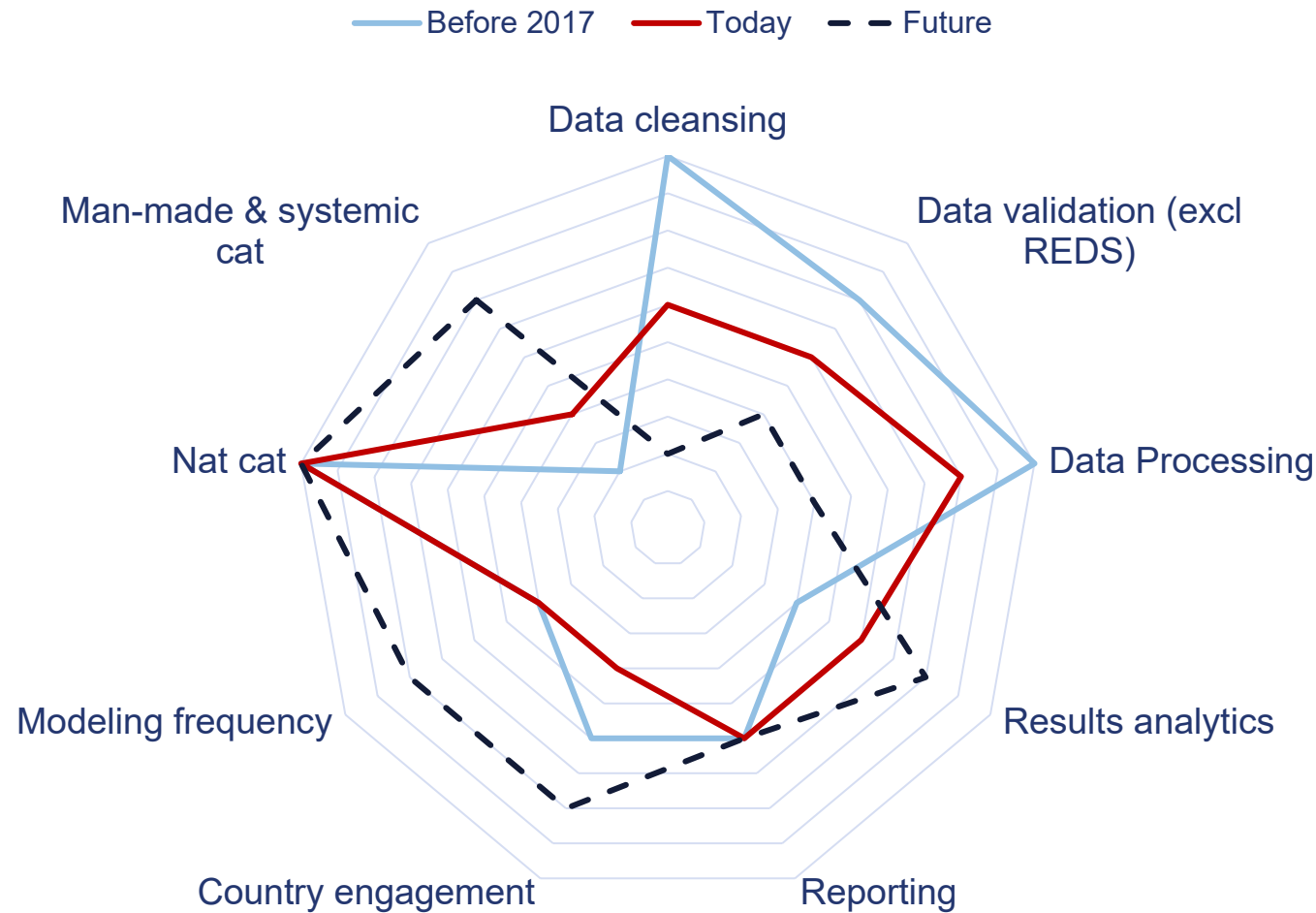
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Cat risk as a Service
Unique view of risk across underwriting to portfolio optimization from the same cat models
Increased model flexibility and transparency
...???

Activities in Cat Modeling continue to shift from exposure to results and include more man-made



Automation of processing in entire modeling pipeline help to **eliminate tedious manual work** such as

- Data cleansing
- Data validation
- Data processing

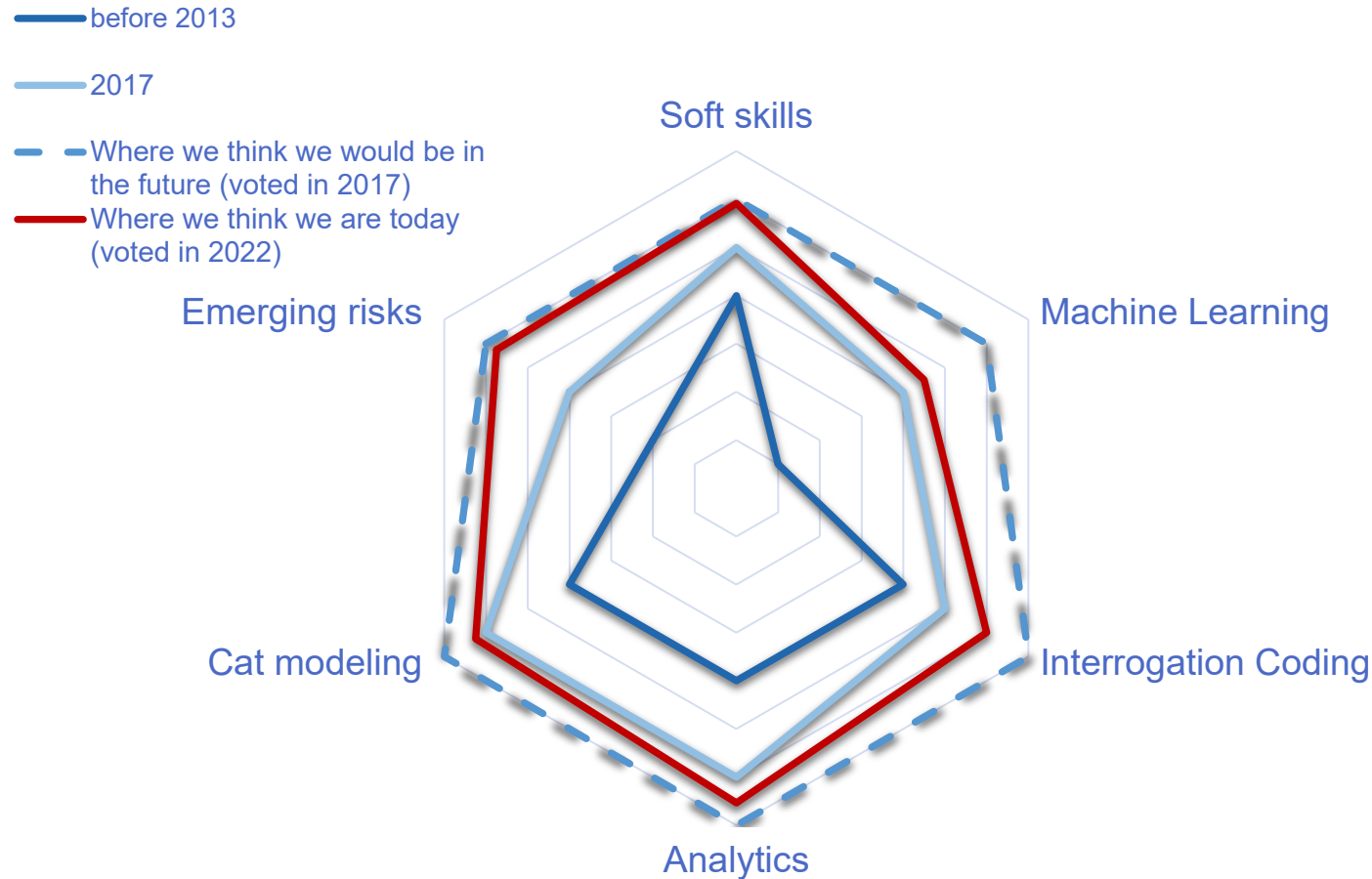
Such that the **work focus shifts** to

- Results analytics
- Higher modeling frequency
- Better country engagement (connection to underwriting systems)

Increased importance for the skills

- Analytics
- Reporting and consulting of results (for e.g. portfolio management)
- IT skills for maintenance of automated setup

Shifting activities require different skills and an increased focus on training



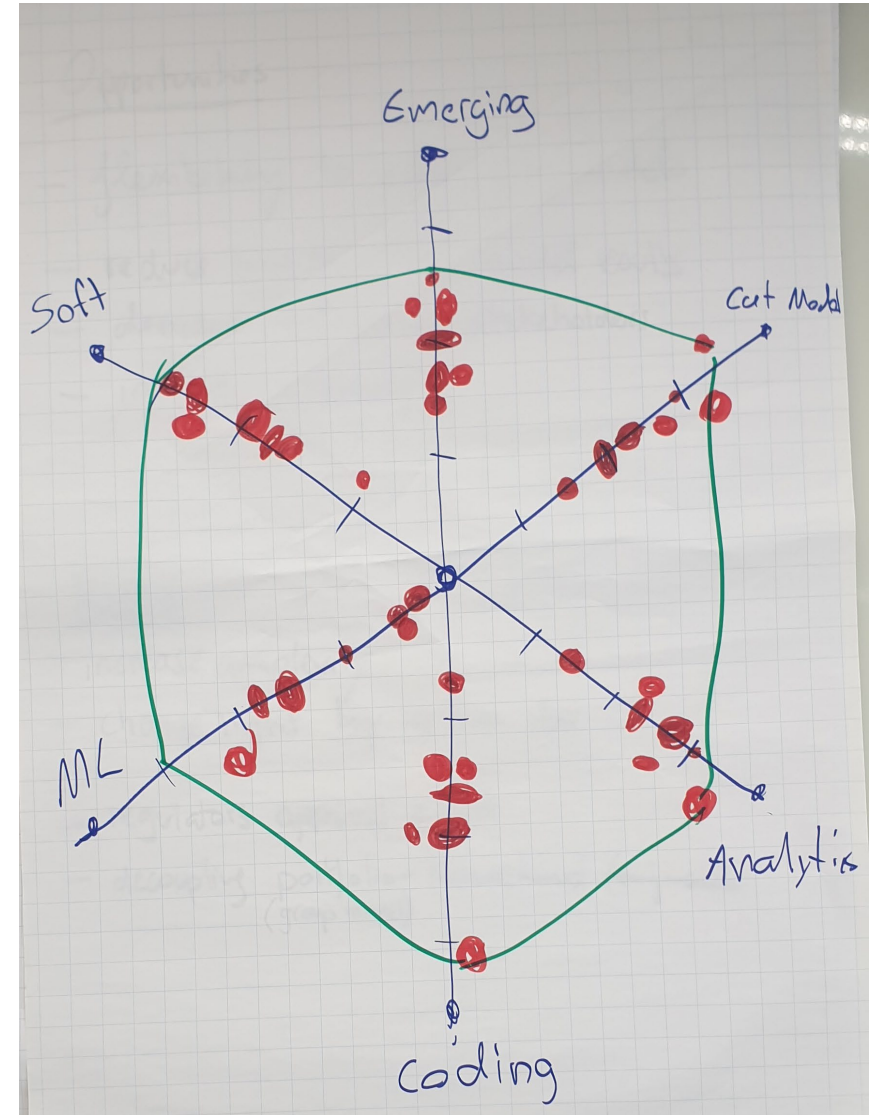
Given an automated data collection and modeling process for the traditional cat modeling, the focus of the skills is shifting

- **Soft skills** for communicating the results to stakeholders
- **Analytics** skills to have (near) realtime analysis of portfolio performance
- Focus on **emerging risks** that we not previously considered due to limited resources
- Application of **new modeling approaches** (machine learning and vendors)
- Focus on **maintaining and building processes** (including interrogation coding)

The skill combination of all team members cover the ideal profile such that the team functions most effectively

Skill archetypes of colleagues in such an environment

- **The analyst**
 - Analysis of the results of the cat modeling process
 - Defining insights that provide granular information to the portfolio and associated risks
- **The IT guy (aka the platform provider)**
 - Creation and maintenance of any IT platform / process needed to automate the cat risk management
 - Including the exposure processing, cat modeling ecosystem, reporting platform...
- **The risk consultant**
 - The communicator that shares the insights with the wider organisation and potentially with external stakeholders (including regulator)
 - Answers the question “so what?” to have a tangible business impact
- **The orchestrator / product owner**
 - Ensures that the connections between the 3 archetypes run smoothly
 - Prioritizes the tasks and development steps to be aligned with the overall strategy



Key Criteria for choosing a Nat Cat Model

Top criteria according to the Group Accumulation Management team's opinions (5 years ago)

Model quality and model validation

- The model is appropriate to estimate the peril (region) risk, i.e., it is in line with the latest science (if exists) and the claims experience, and it is sufficiently granular to allow for accumulation/diversification modeling

Transparency and accessibility (including documentation)

- The models are ideally open access such that each modeling assumption can be interpreted and understood to have a good understanding of the strengths and weaknesses of the models
- The models are always accessible such that the model can be analysed when needed

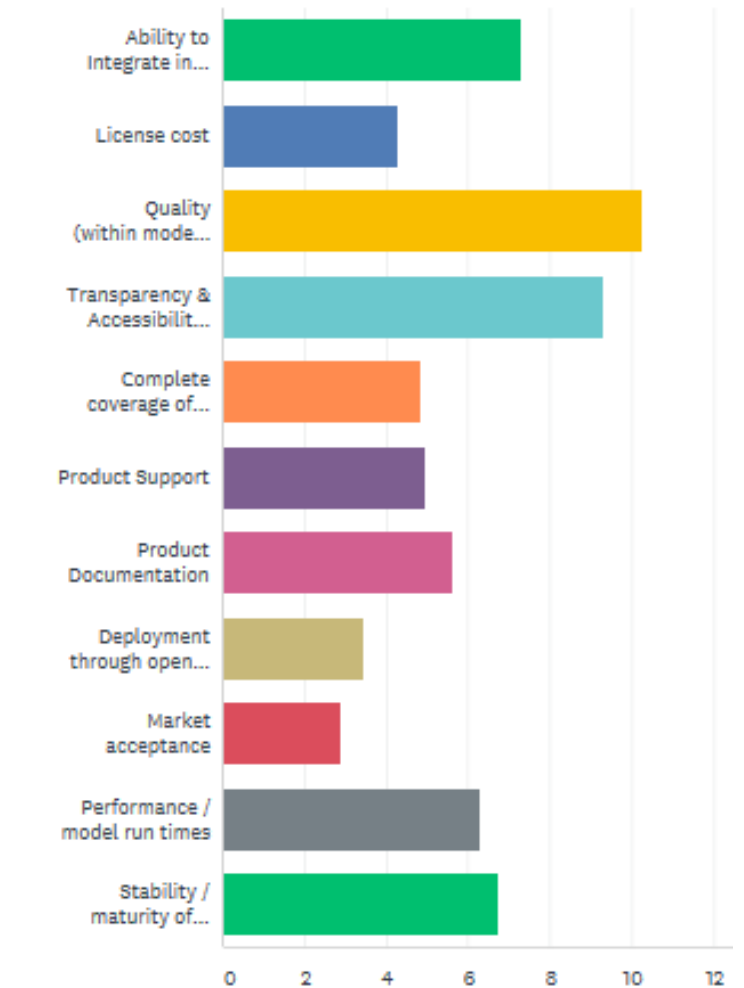
Ability to integrate in existing workflow

- The models can ideally be containerized and deployed as a microservice such that other business processes can call the model through APIs

Stability / maturity

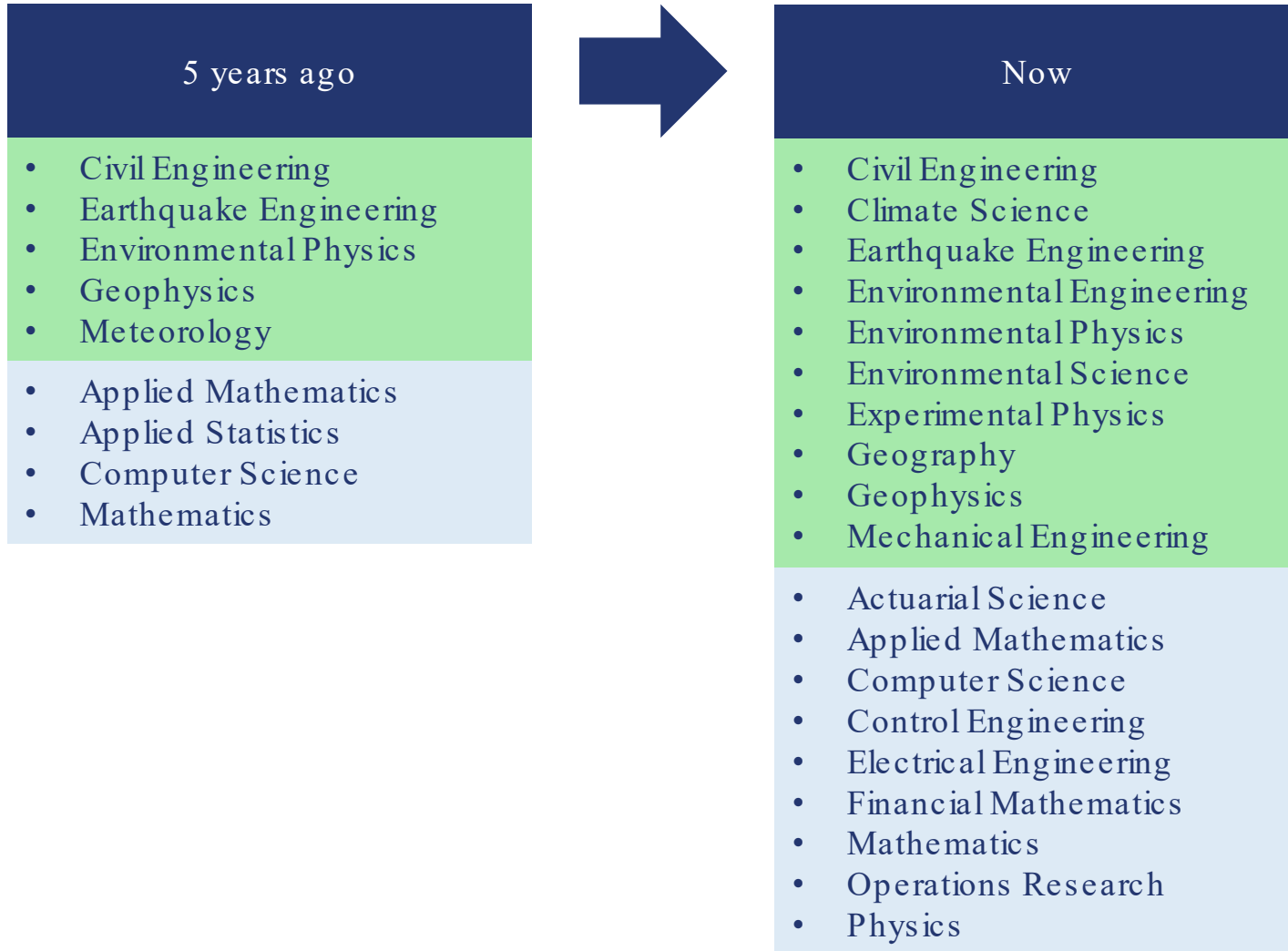
- To ensure a reliable cat risk assessment, the model needs to be stable over time and needs to be deployed on a mature platform

Answered: 15 Skipped: 0



Insurance topics influence the required skill basis

Educational background of Group Accumulation Management team members



Trends over the past 5 years that influenced the hired talent profile

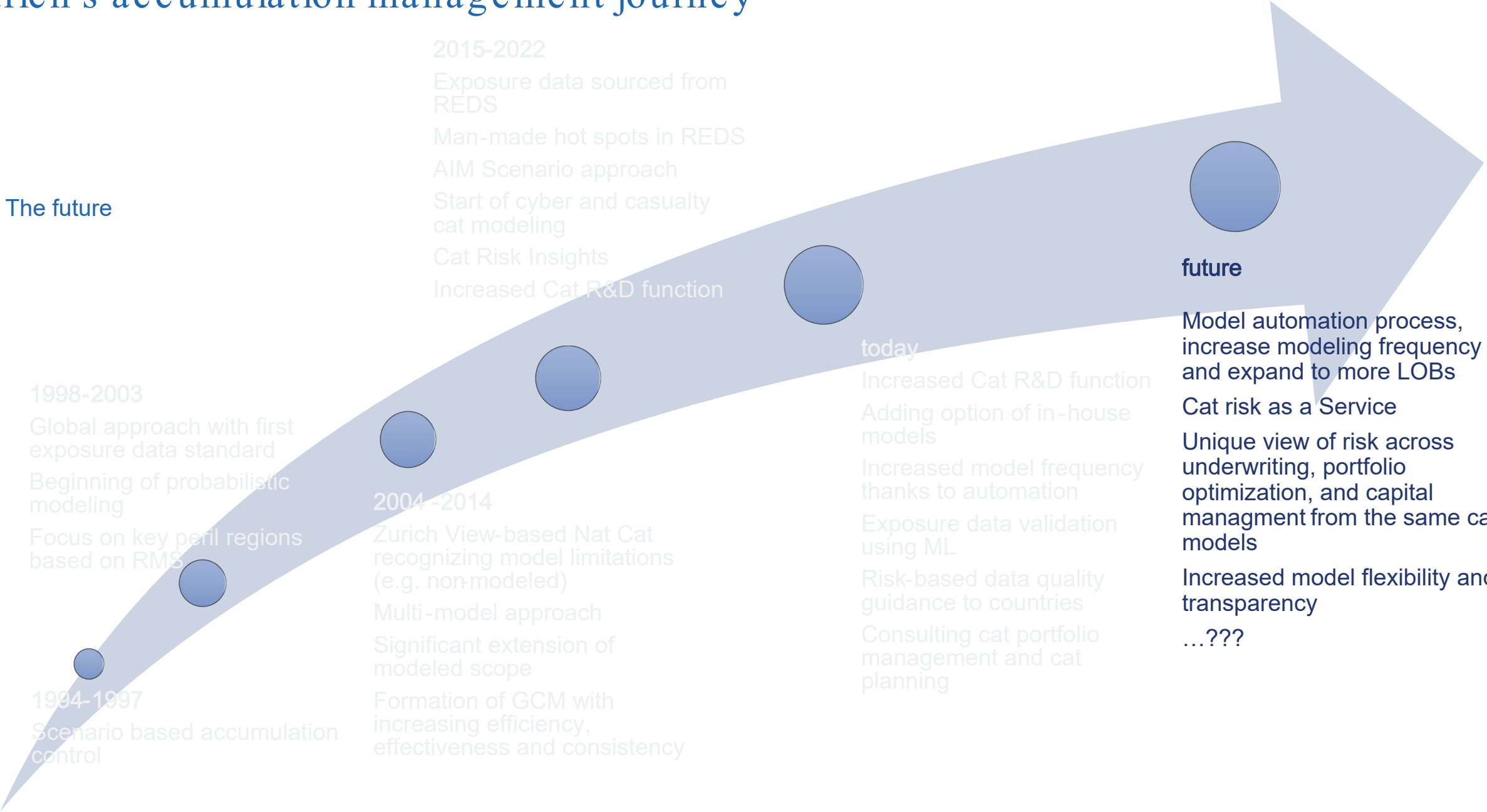
- Emerging manmade risks such as cyber, casualty cat, pandemic
- Importance of climate change risk assessment
- Wider acceptance of machine learning and artificial intelligence approaches
- Automated IT processes
- Building inhouse models
- Growing team size
- More diverse educational background

The future



Zurich's accumulation management journey

The future



1994-1997

Scenario based accumulation control

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...???

The mega-trends shaping our future

Starting today

Climate change



Continuing global warming accelerated by economic growth

Technological disruption



Increasing automation of repetitive tasks accelerates the shift of workforce to new jobs

Demographic shifts



Median age continues to increase across the globe leading to different outcomes depending on starting point

Fracturing world



More states are competing for influence as the Western world loses dominance

Social instability



Social and economic polarisation, disruption and eroding trust leads to greater social unrest

The future of insurance industry

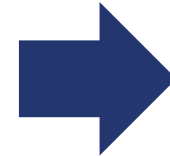
Starting yesterday



- **Climate change research** → use climate studies to condition conventional cat models
- **Risk consulting** → use the gained cat model insights to inform clients and customers
- **Climate change as a service** → develop and communicate tangible climate change actions



- **Automated modeling and underwriting** (parametric insurance) → increase the sales process to be faster than the competition
- **Generative machine learning models** → prompt engineering to make the best out of existing (pre-trained) models
- **Big data** → leverage larger amounts of user data to better predict customers' behavior
- **Dynamic risk assessment** → adapt insurance pricing based on current market conditions and evolving perils



Shift in skills and team composition

Relevant trends for cat management in the near future

a subset of use cases addressing the general insurance trends

Technology

Technology advancements
(cloud, SaaS, AI)

Automation of cat risk management
→ focus presentation 1

Value chain expansion
(e.g. exposure mgmt., portfolio optimisation, ..)
→ focus presentation 2

Scope

Cat models

Changing model requirements
(e.g. transparency, on premise/cloud, scalability, flexibility, ..)
→ focus presentation 3

Internal versus external providers of cat management services
(models, insights ..)

LoB scope extension
(besides HU and EQ, focus on terrorism, cas cat, climate change, cyber..)

Credibility

Data quality
(more sophisticated models and processes require better quality and higher granular data).

Data enrichment – rising importance
(How do we manage the imperfect data?)
→ focus presentation 4

Credentialization
(education and certificates for cat management)

Relevant trends for cat management in the near future

Technology

Technology advancements (cloud, SaaS)

- Cloud infrastructure to **scale automatically** and improved redundancy
- Infrastructure as a Service (**IaaS**), Platform as a Service (**PaaS**), Software as a Service (**SaaS**)
- Off-premise services require understanding of **systems under third party's control**
- More **IT specialist skills** needed to operate and maintain the system

Technology advancements (AI)

- Machine learning and artificial intelligence on the rise due to **fast and bespoke hardware development** in combination with **advances in science**
- **Growing understanding and acceptance** of ML-based process, regulation is following
- Higher demand in **ML-based skills** (shortterm) and ML as a Service (midterm)
- New skill sets emerge, e.g., **prompt engineer**

Automation of cat risk management

→ **focus presentation 1**

- **Containerization** and standardization of services
- Interaction with standardized protocols (such as **APIs**)
- Building of **automation pipelines** (ideally from underwriting systems to portfolio results reporting) that require limited input from cat modellers
- **Micro-services** enable other functions in the company to use the cat modeling expertise
- More **IT specialist skills** needed to operate and maintain the system

Relevant trends for cat management in the near future

Cat model evolution

Changing model requirements

(e.g. transparency, on premise/cloud, scalability, flexibility, ...)

→ focus presentation 3

- Focus on **transparency and adaptability** to better reflect proprietary view of risk
- **Connectivity** to leverage the technological advancements

Data quality

(more sophisticated models and processes require better quality and higher granular data).

- **Standardization** of exposure data such that analysis is reliable across portfolios
- Higher quality models demand for **higher granularity** in exposure data

Internal versus external providers of cat management services

(models, insights ..).

- Development of internal capabilities to close **model gaps** (e.g. emerging risks)
- **All-in-one solutions** (underwriting, cat model, location insights ..).

Data enrichment – rising importance

(How do we manage the imperfect data?)

→ focus presentation 4

- Missing data replaced by industry-typical assumptions
- Using third party data **to enrich exposure / model data**
- Using third party data to predict exposure features before the point of underwriting, i.e., for **pro-active risk selection**

→ **EITHER** focus on **inhouse capabilities** to better understand the modeling process at each step

→ **OR** outsourcing the entire cat modeling process to 1 or multiple third parties, i.e., **Cat Risk as a Service**

Relevant trends for cat management in the near future

Scope expansion

Value chain expansion

(e.g. exposure mgmt., portfolio optimisation, ...)

→ focus presentation 2

- Given the automation, cat risk management systems **connect directly to portfolio management and underwriting systems** for better risk selection and portfolio steering
- Automated connection to reinsurance and economic model
- Cat risk models to **inform location insights** analyses and consulting
- Spreading the cat risk knowhow to more **business functions** in a systematic way
- **Communication and connectivity** to other parties more important

LoB scope extension

(besides HU and EQ, focus on terrorism, cas cat, climate change, cyber..)

- **Emerging risks** such as casualty cat, cyber, pandemics
- **Time-dependency** as an additional dimension in perils that typically assumed stationary, e.g., atmospheric perils subject to climate change
- More in-depth knowledge of cat related phenomena needed that goes **beyond the typical scope** of cat models that can be licensed
- **New perspectives** on existing or new perils needed

Relevant trends for cat management in the near future

Credentials



Credentialization

(education and certificates for cat management)

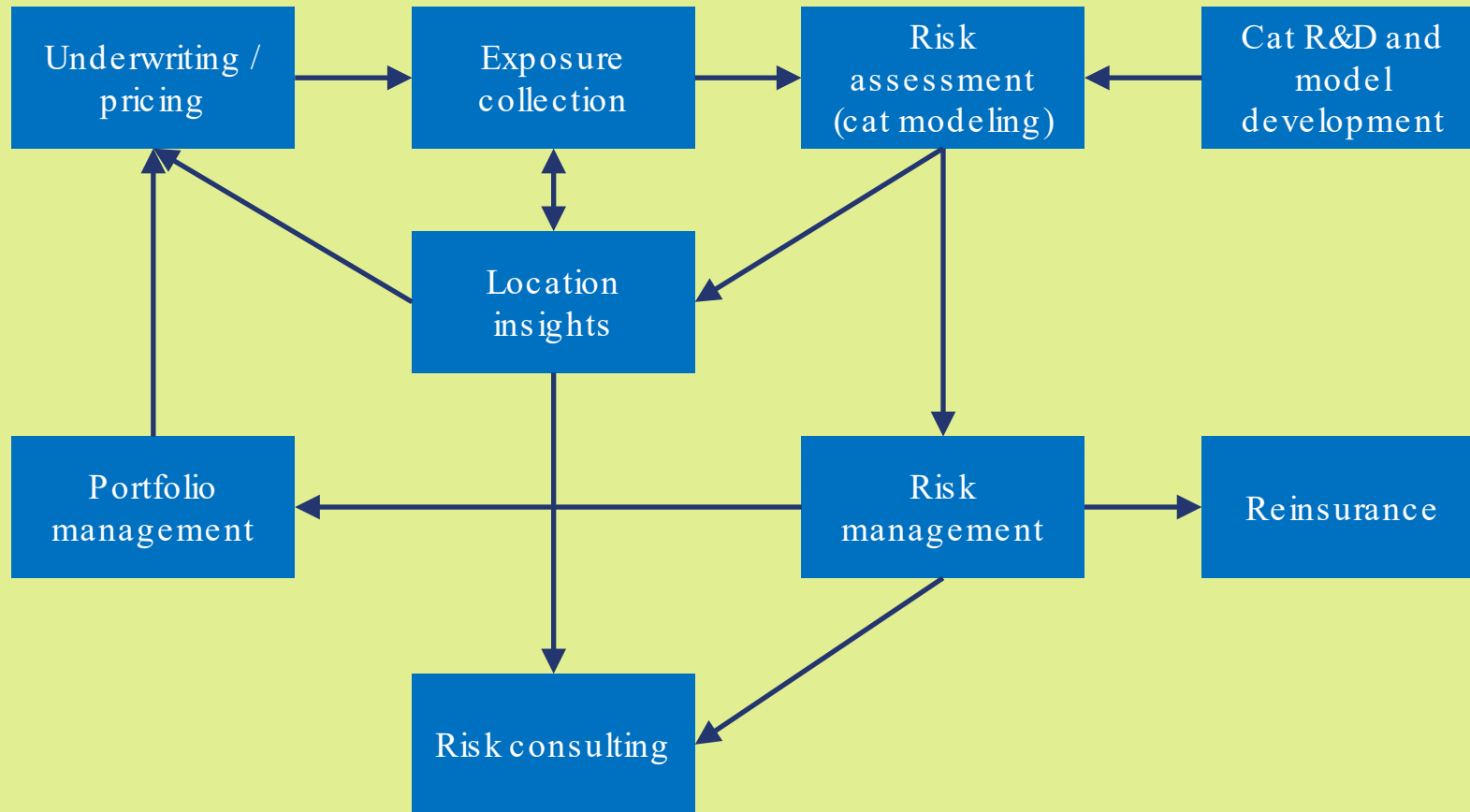
- Programs to **accredit cat modeling expertise** and skills
 - ISCM & iCAS Credentials Program, Verisk's Certified Extreme Event Modeler Program, Moody's RMS Certified Catastrophe Risk Analyst (CCRA) Training Program...
- Enable **standardisation and transferability of skills**



Cat management – the complex story

Cat management is an integrated process in the wider insurance environment

Cat management landscape within an insurance company



Increased availability of data and models

Emerging perils

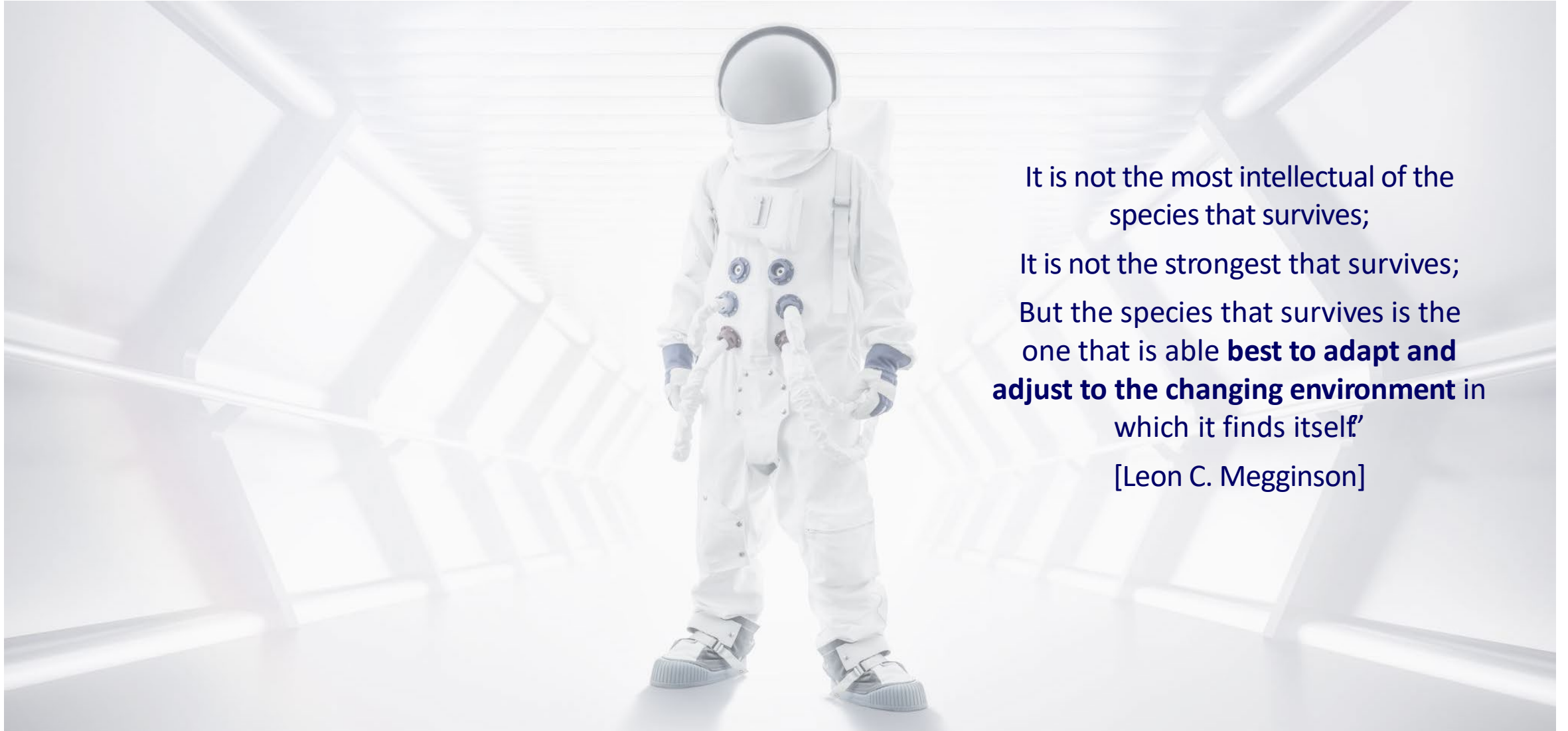
New Lines of Business and products

New modeling techniques (dynamic risks, ML&AI)

IT infrastructure towards the cloud

Regulation

The future will be different
.for sure



It is not the most intellectual of the
species that survives;
It is not the strongest that survives;
But the species that survives is the
one that is able **best to adapt and
adjust to the changing environment** in
which it finds itself'
[Leon C. Megginson]

Antitrust Statement



ISCM Seminar on Present and future cat management: What skills are needed for successful teams?, 26 September 2023

- At ISCM we promote catastrophe management professionalism within the insurance industry and at today's seminar we will exchange experience in the use of artificial intelligence and machine learning in catastrophe risk management.
- While engaging in these discussions, we will be mindful of various national and international laws which restrict the exchange of information among competitors and in particular applicable antitrust rules. All participants shall be aware of their obligations in this respect.
- We will therefore refrain from entering into any discussion, accord, agreement or understanding, or concerted action that could restrict or distort competition between us, and from disclosing any competitively sensitive information to each other. We will follow the agenda and each participant shall be obliged to speak up immediately for the purpose of preventing any discussion falling outside of what is legally permissible.

Thank you

Join at
slido.com
#2400 799



paraskevi.giannakaki@zurich.com

roland.schoebi@zurich.com

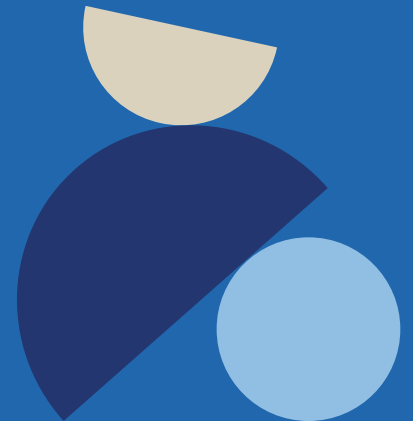
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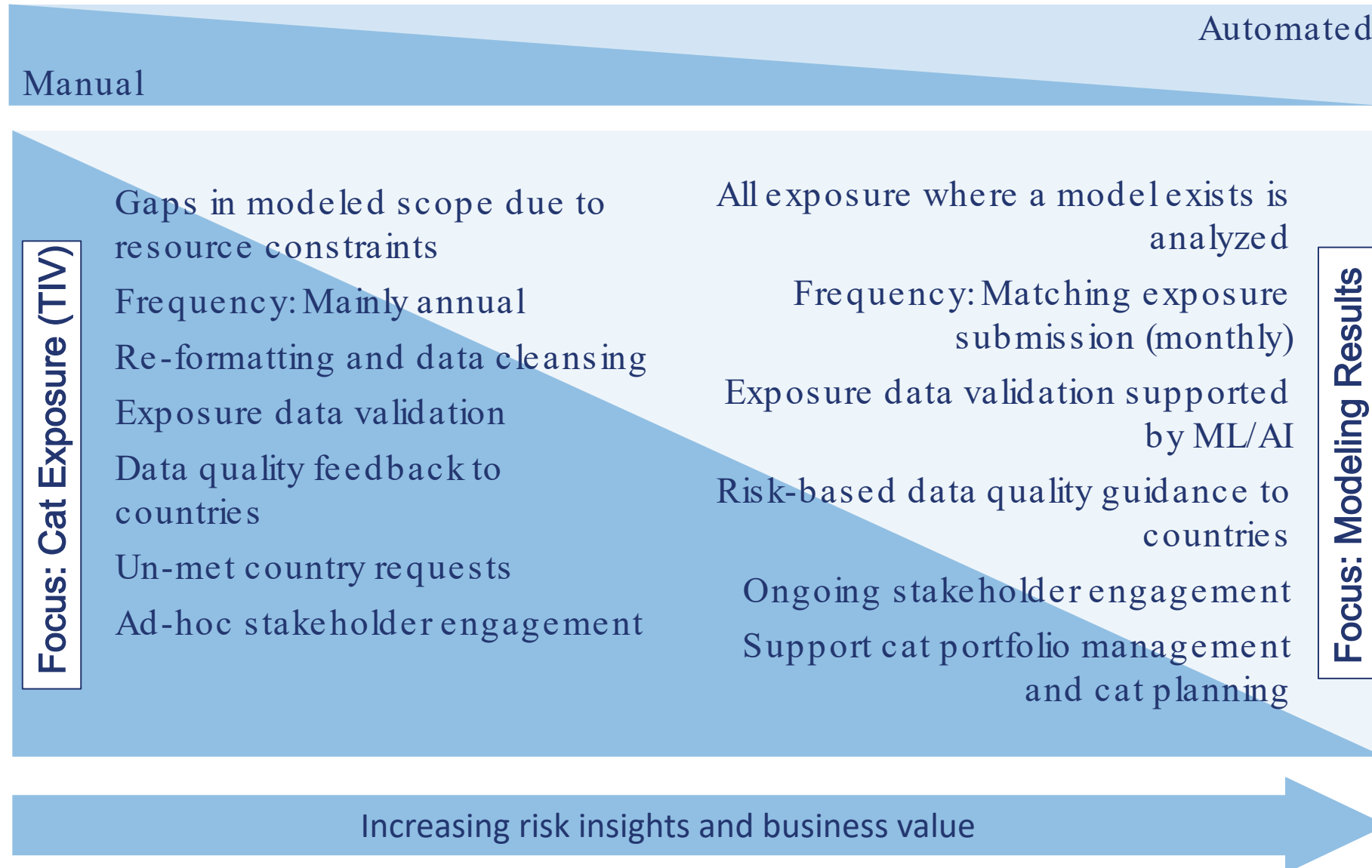
Please fill in the survey

ⓘ Start presenting to display the poll results on this slide.

APPENDIX



The effect of increased automation – Generating more risk insights and business value



ISCM Zurich 2023

Automation of Cat Risk Management

Amaryllis Mouyiannou, PhD



Risks are still unpredictable

causing catastrophic outcomes for the insurers

5%

Growing trend

Due to the accumulation of value such as human and physical assets, the real annual growth rate of normalised losses from natural catastrophes measured 5% over the last 50 years, showing a rising trend.

190bn

Losses

Global economic losses from natural catastrophe events in 2020 were USD 190 billion.

274

Catastrophe events

Data shows that historic loss data is not enough in a world of increased socio-economic changes such as urbanisation, population growth and economic development.

92% of P&C insurers expect big data to generate significant improvements in pricing, underwriting and risk selection over the next two years.



01

Quality Data

Insurers struggle to get access to reliable and accurate statistical data. Majority of the available data is often disaggregated, unstructured and generally underutilised.

02

Tools and Models

Burden of technology expertise and investment is becoming a big threat for smaller carriers.

03

Disjointed Insurance Processes

Often data is not integrated across insurance value chain affecting efficiency and agility.

Swiss Re Solutions

Delivered now!

The Impact+ Advantage – analytics.swissre.com



01

Largest Data Pool

One of the largest risk and insurance data pools worldwide tailored to local markets.

Granularity in pricing, portfolio steering – leveraging your and our portfolio data, but also external data sources.

02

Proprietary Tools and Models

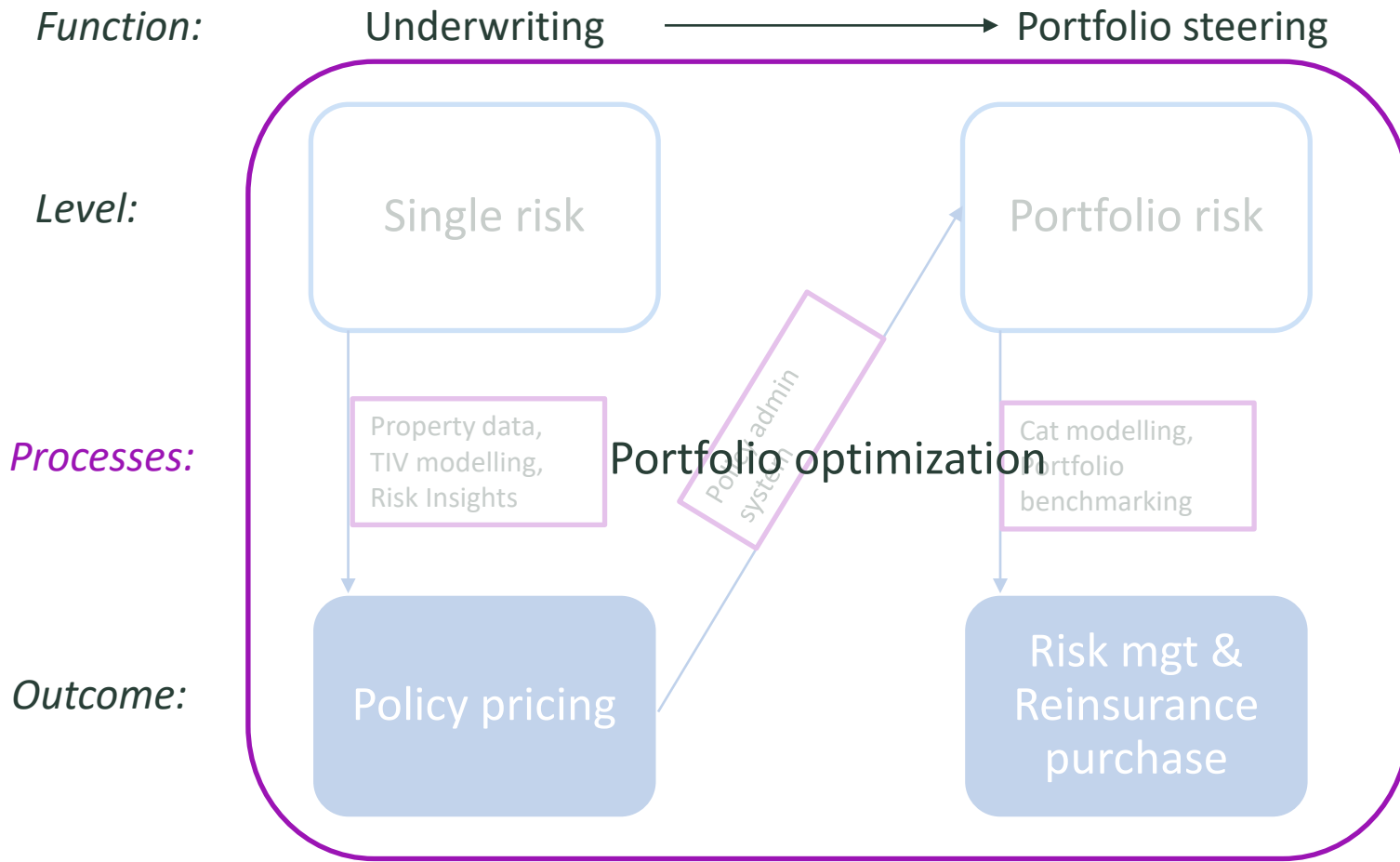
Broad range of analytical tools and methods for more precise pricing, market growth strategies and the assessment of your risk exposure.

03

Seamless support across insurance value chain

Our insights are accessible to clients via APIs or a web-hosted platform

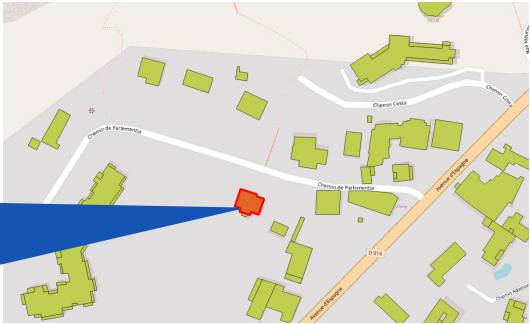
Possible automation within the Property Risk mgt value chain e.g. Insurance companies



France Risk Intelligence

Leveraging our building stock model and risk knowledge to consult on policy pricing and portfolio steering

Location use-case



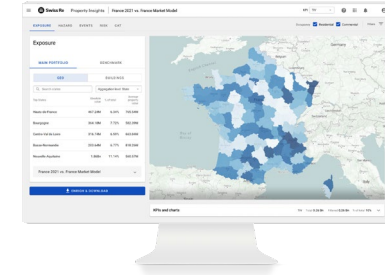
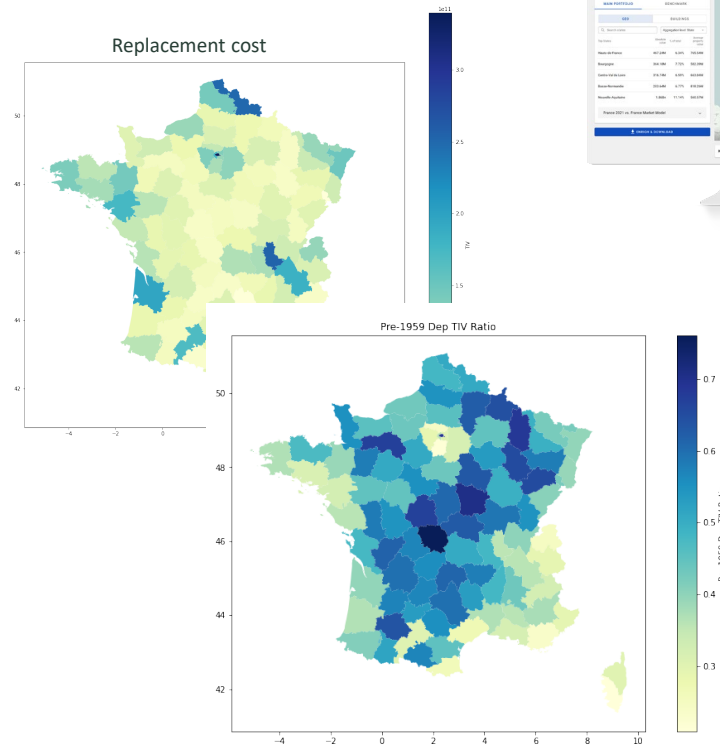
Building Attribute	Value
Occupancy	Residential
Number of Stories	2
Floor area	200 m ²
Wall Material	Stone / Millstone
Roof Material	Roof Tiles
Building Value	€ 254'000
Contents Value	€ 38'129

Risk Scores
<ul style="list-style-type: none"> • average annual damage ratio relativities • addressed perils: Flood, Windstorm, Hailstorm, Earthquake

Portfolio use-case

Market benchmarking

- ✓ Compare your portfolios to the building stock portfolio
- ✓ Identify areas with higher vulnerabilities



EXPOSURE

HAZARD

EVENTS

RISK

CAT

KPI Building TIV

Aggregation Level State

Filters

Download

ADD LOCATION +

FRANCE - CLIENT

FRANCE RISK INTELLIGENCE

GEO

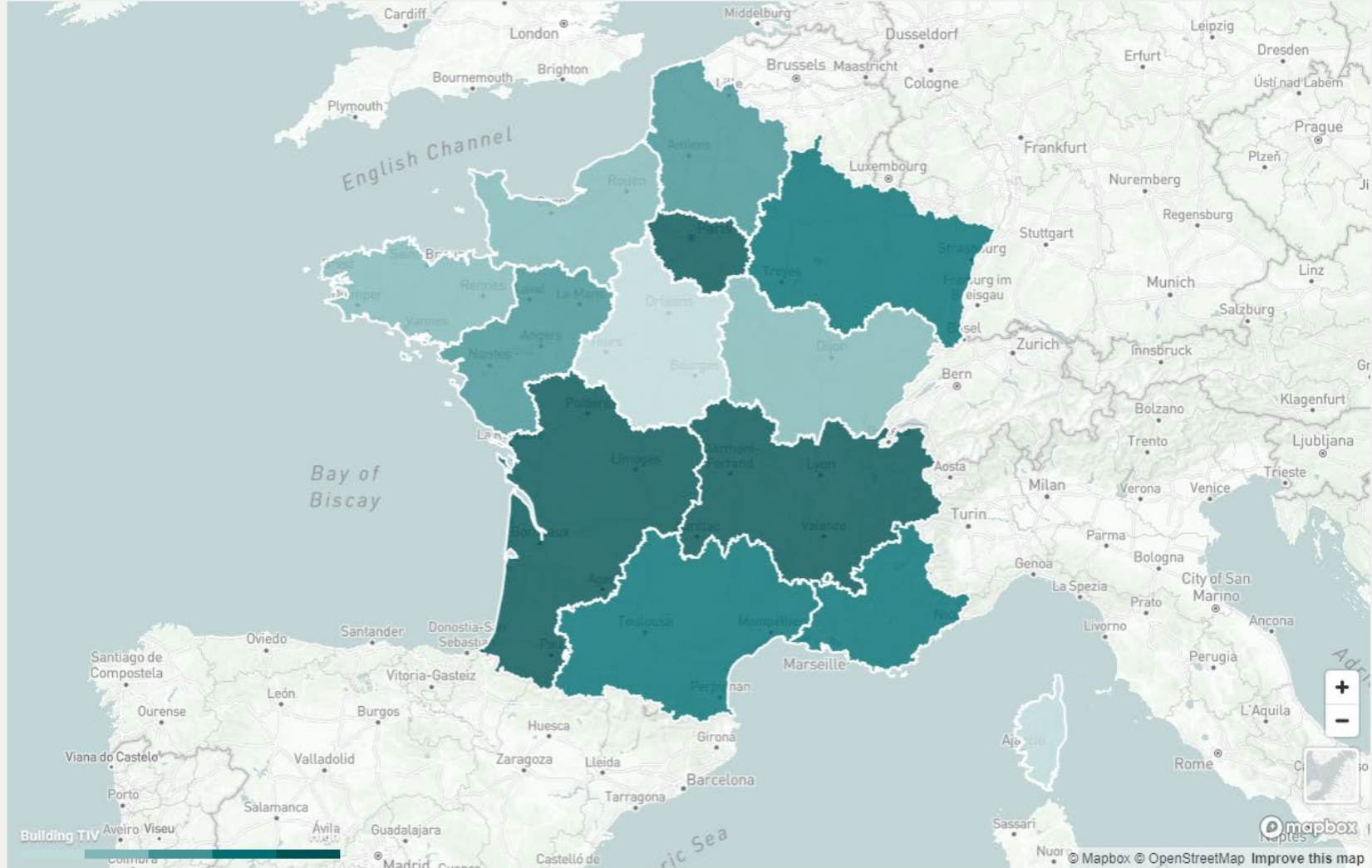
BUILDINGS

CUSTOM

Search by State

Top States	Absolute value	% of total	Average property value
Ile-de-France	2.73Bn	15.20%	647.83K
Rhone-Alpes	2.48Bn	13.80%	322.17K
Nouvelle-Aquitaine	1.89Bn	10.50%	203.94K
Occitanie	1.82Bn	10.14%	237.98K
Grand Est	1.56Bn	8.68%	265.60K
Provence-Alpes-Cote d'Azur	1.46Bn	8.09%	342.64K
Hauts-de-France	1.22Bn	6.76%	198.94K
Pays de la Loire	1.11Bn	6.15%	225.52K
Bourgogne	1.00Bn	5.57%	277.57K

France - Client vs. France Risk Intelligence 0.16% Total share



Main Portfolio KPIs and charts

Building TIV

Total 17.99Bn

Filtered 17.99Bn

Total locations 66.28K

EXPOSURE

HAZARD

EVENTS

RISK

CAT

KPI

Building TIV

Aggregation Level

State

Filters

Download

ADD LOCATION +

FRANCE - CLIENT

FRANCE RISK INTELLIGENCE

GEO

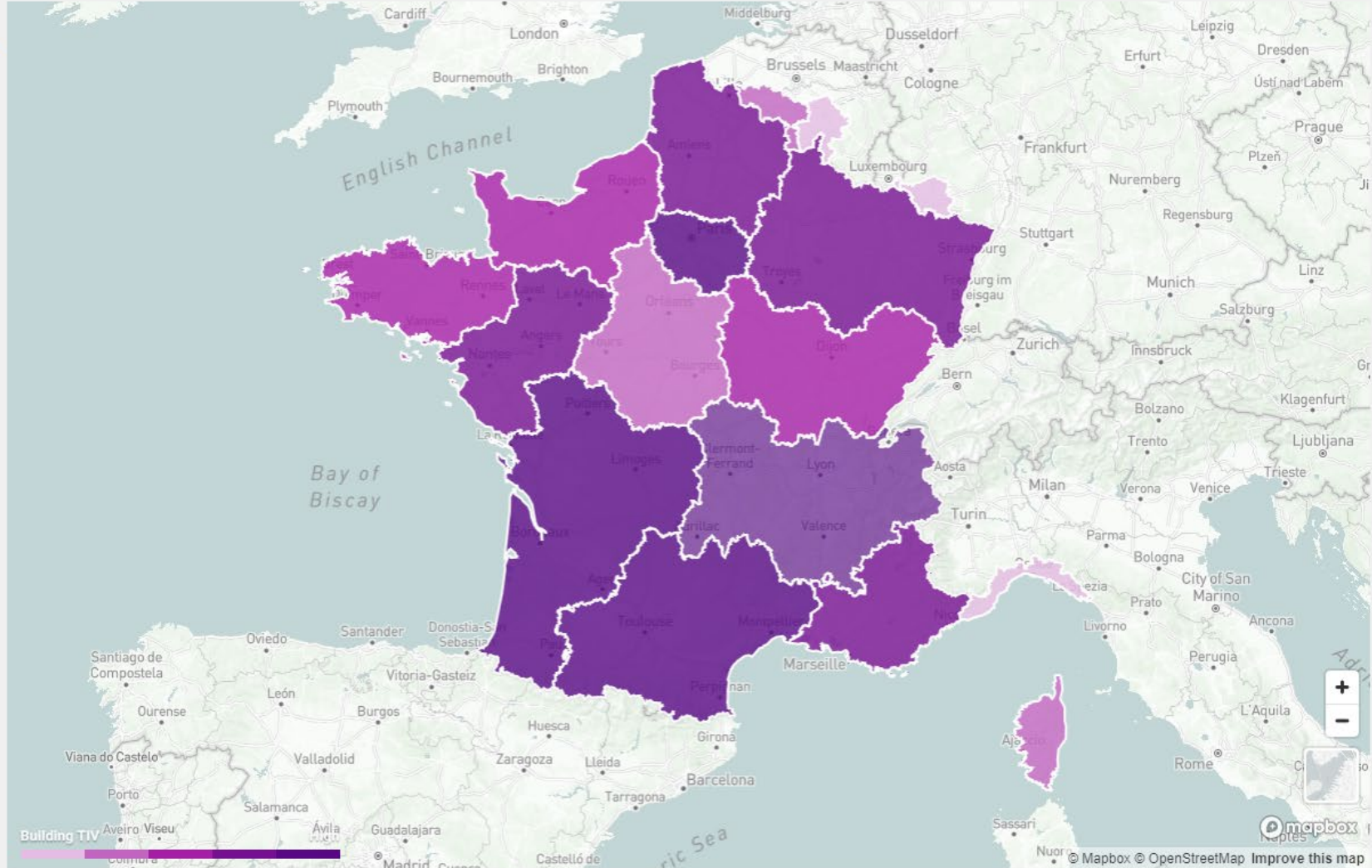
BUILDINGS

CUSTOM

Search by State

Top States	Absolute value	% of total	Average property value
Rhone-Alpes	1566.36Bn	14.29%	357.47K
Ile-de-France	1530.55Bn	13.96%	576.35K
Nouvelle-Aquitaine	1162.49Bn	10.61%	222.97K
Occitanie	1052.47Bn	9.60%	245.69K
Grand Est	1036.42Bn	9.46%	318.74K
Provence-Alpes-Cote d'Azur	919.82Bn	8.39%	392.11K
Hauts-de-France	809.47Bn	7.39%	215.21K
Pays de la Loire	682.11Bn	6.22%	237.31K
Bretagne	645.04Bn	5.88%	244.91K

France - Client vs. France Risk Intelligence 0.16% Total share



Main Portfolio KPIs and charts

Building TIV

Total 17.99Bn

Filtered 17.99Bn

Total locations 66.28K

FRANCE - CLIENT

FRANCE RISK INTELLIGENCE

GEO

BUILDINGS

CUSTOM

Search by State

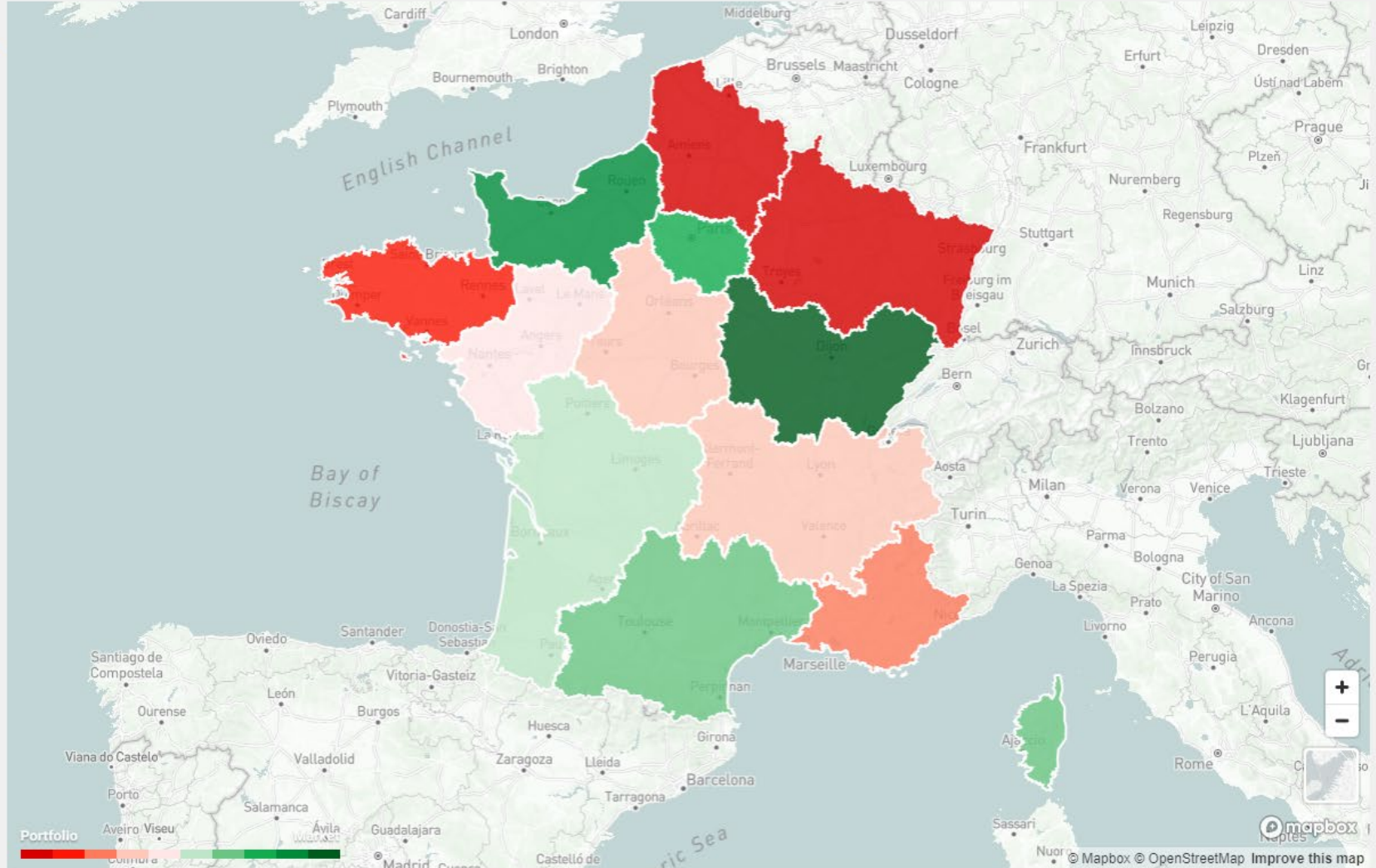
France Risk Intelligence 0.16% Total share

Show comparison map

Change

Change from France Risk Intelligence to France - Client Density factor Average address TIV

Others	-99.78%	1.31	-29.93%
Bourgogne	-99.82%	1.12	+5.94%
Basse-Normandie	-99.82%	1.09	+3.31%
Ile-de-France	-99.82%	1.09	+12.40%
Corse	-99.82%	1.08	-4.45%
Occitanie	-99.83%	1.06	-3.14%
Nouvelle-Aquitaine	-99.84%	0.99	-8.54%
Pays de la Loire	-99.84%	0.99	-4.97%
Centre-Val de Loire	-99.84%	0.97	-4.41%



Main Portfolio KPIs and charts

Building TIV Total 17.99Bn Filtered 17.99Bn Total locations 66.28K

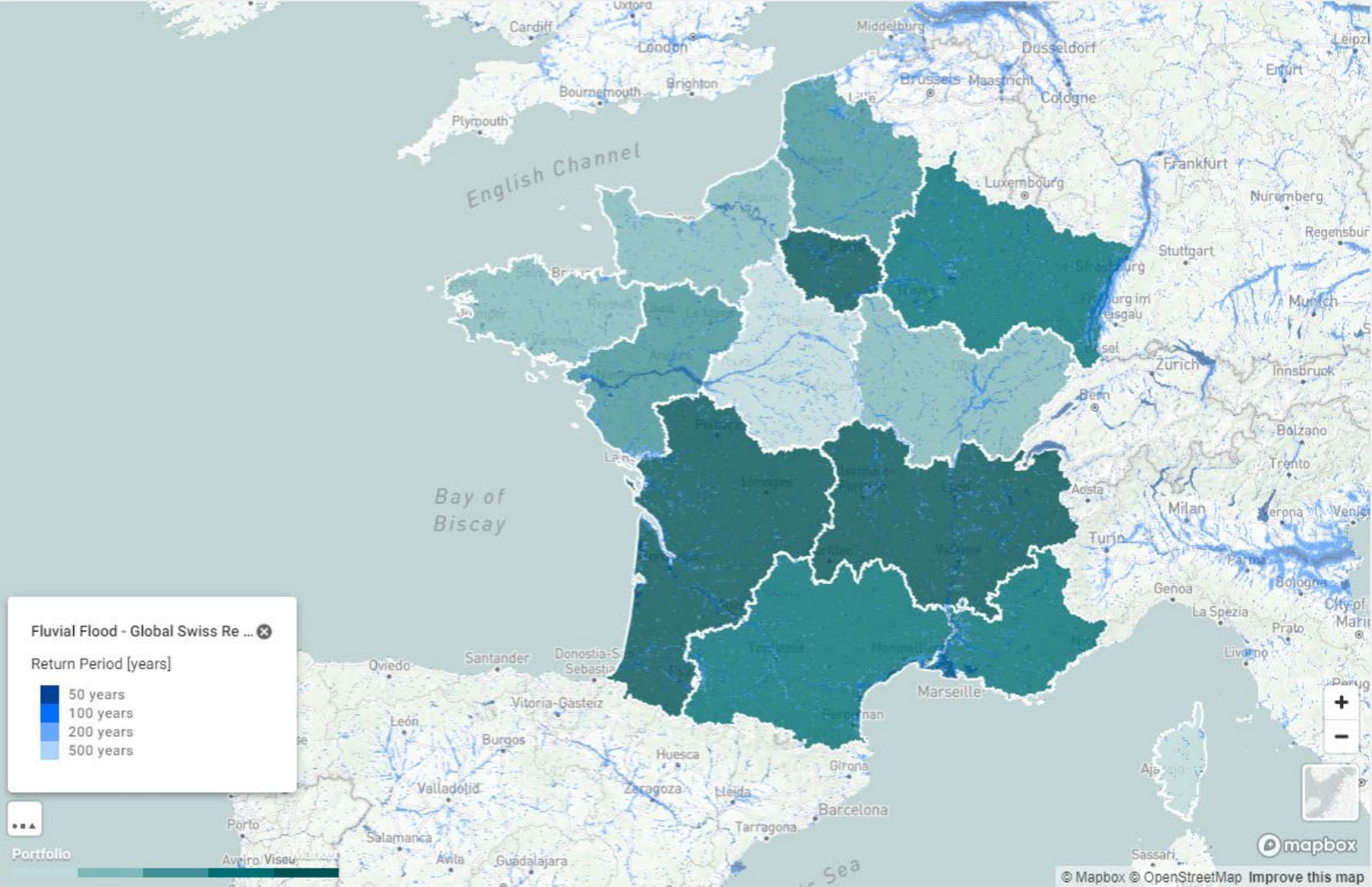
FRANCE - CLIENT

FRANCE RISK INTELLIGENCE

Swiss Re Global Flood Zones

Swiss Re Global Flood Zones	Building TIV	% of total
50 years	340.92M	1.90%
100 years	1.38B	7.65%
200 years	962.21M	5.35%
500 years	714.18M	3.97%
Outside	14.60B	81.14%

- Official Flood Zones (selected countries)
- Swiss Re Global Storm Surge Zones
- Earthquake
- Tsunami
- Windstorm
- Hailstorm
- Tornado



Main Portfolio KPIs and charts

Building TIV Total 17.99Bn Filtered 17.99Bn Total locations 66.28K

FRANCE - CLIENT

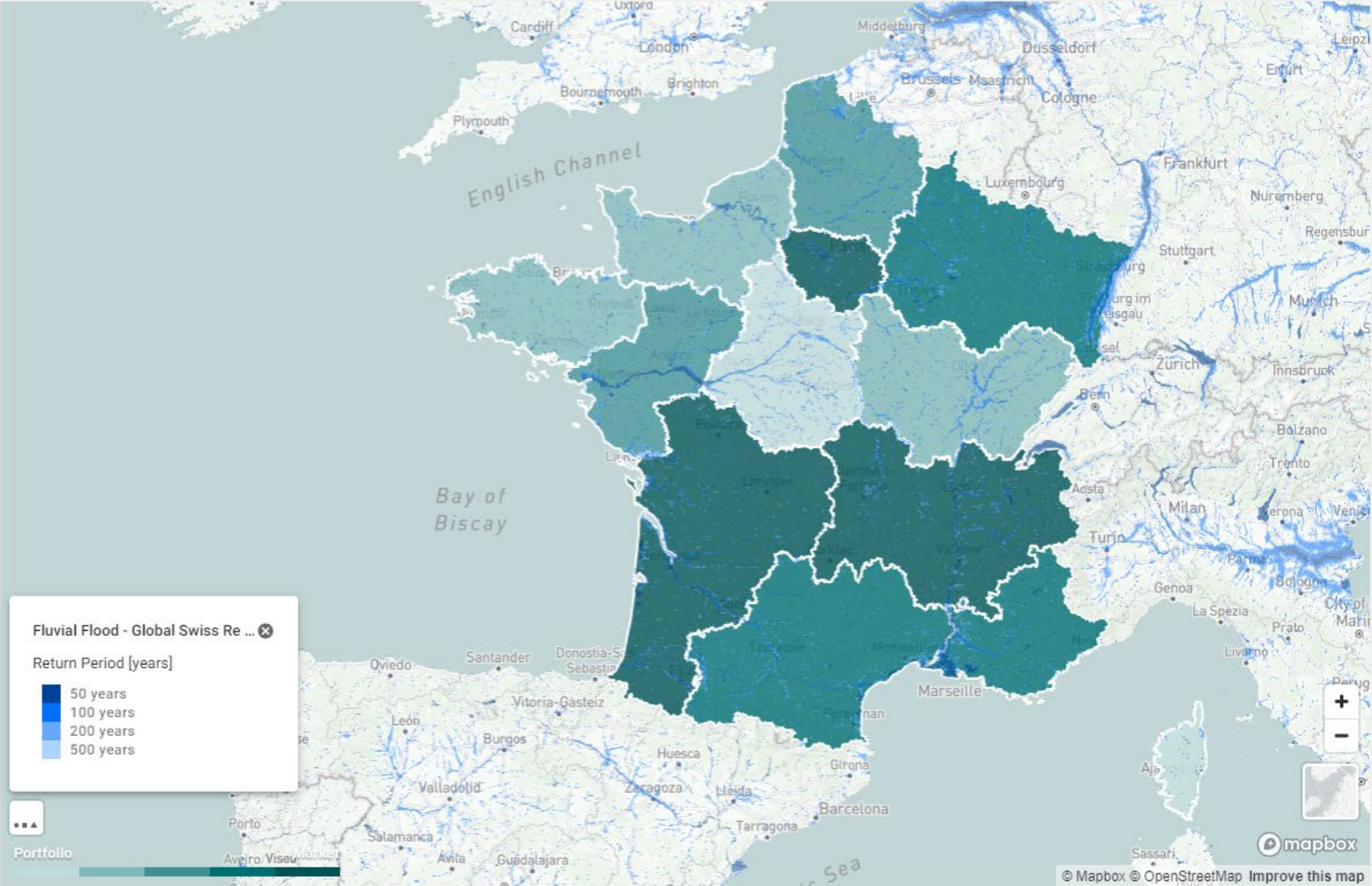
FRANCE RISK INTELLIGENCE

Swiss Re Global Flood Zones

View the comparison of the two portfolios:

Hazard	France - Client Abs. and Share	Percentage Points Difference	France Risk Intelligence Abs. and Share
50 years	340.92M 1.90%	0.22%	231.46Bn 2.11%
100 years	1.38Bn 7.65%	0.82%	927.67Bn 8.46%
200 years	962.21M 5.35%	0.54%	645.57Bn 5.89%
500 years	714.18M 3.97%	0.23%	460.70Bn 4.20%
Outside	14.60Bn 81.14%	1.81%	8695.61Bn 79.33%

- Official Flood Zones (selected countries)
- Swiss Re Global Storm Surge Zones
- Earthquake
- Tsunami
- Windstorm
- Hailstorm



Fluvial Flood - Global Swiss Re ...

Return Period [years]

- 50 years
- 100 years
- 200 years
- 500 years

Main Portfolio KPIs and charts

Building TIV Total 17.99Bn Filtered 17.99Bn Total locations 66.28K

EXPOSURE **HAZARD** EVENTS RISK CAT

KPI Building TIV Aggregation Level Post Code Filters 4 Download ADD LOCATION +

FRANCE - CLIENT

FRANCE RISK INTELLIGENCE

Swiss Re Global Flood Zones

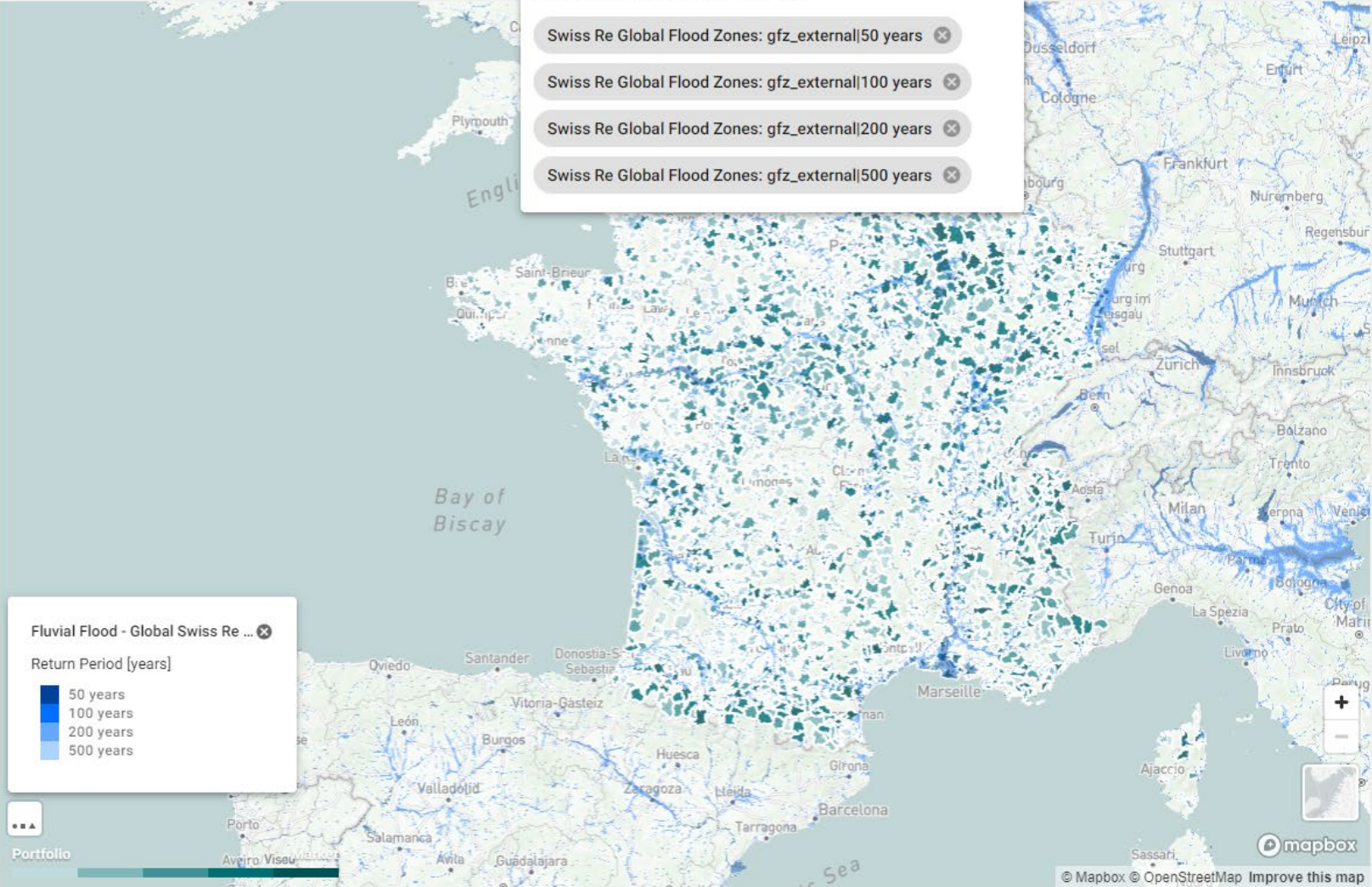
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- Official Flood Zones (selected countries)
- Swiss Re Global Storm Surge Zones
- Earthquake
- Tsunami
- Windstorm
- Hailstorm

Data filters & Map view settings

- Swiss Re Global Flood Zones: gfz_external|50 years
- Swiss Re Global Flood Zones: gfz_external|100 years
- Swiss Re Global Flood Zones: gfz_external|200 years
- Swiss Re Global Flood Zones: gfz_external|500 years



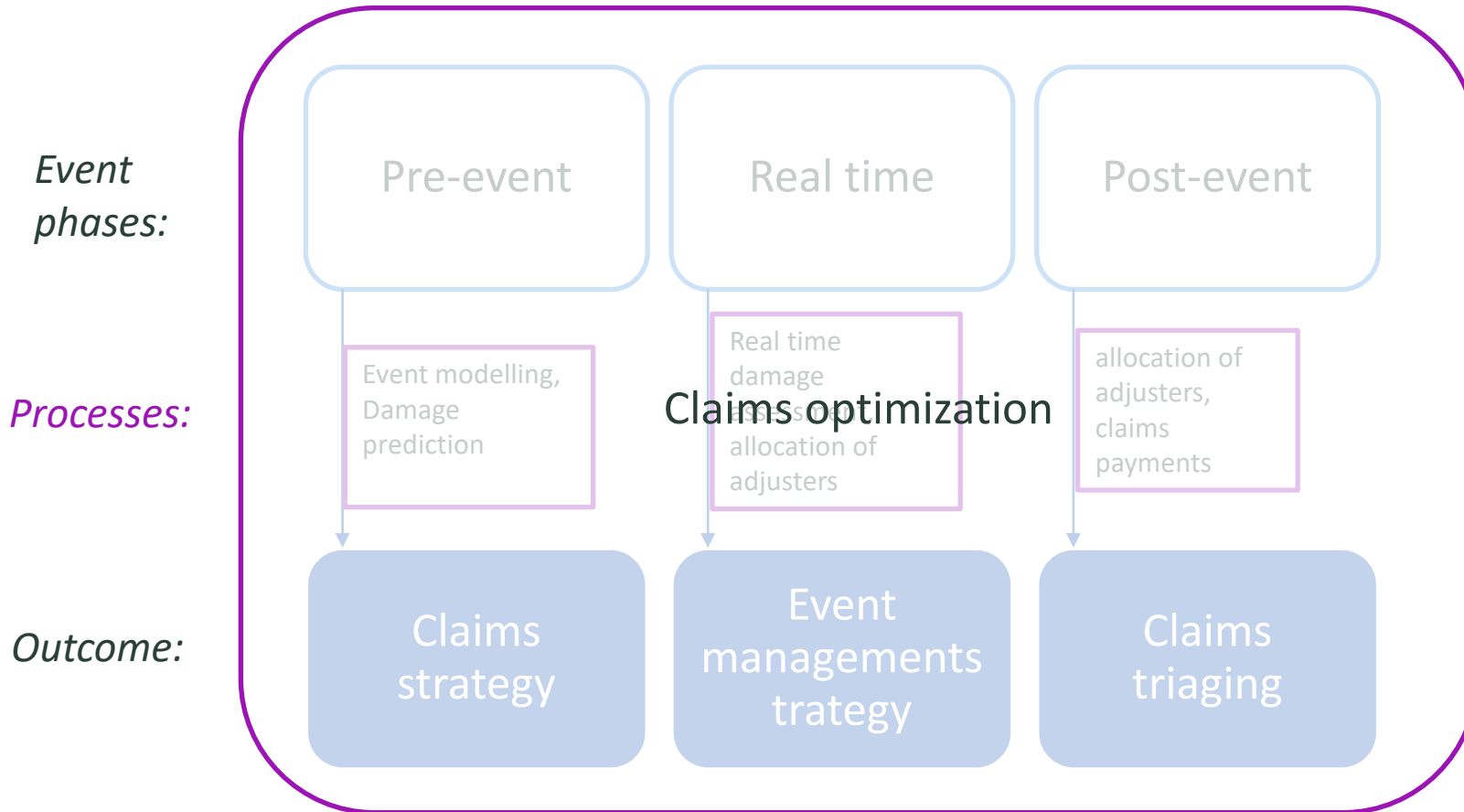
Main Portfolio KPIs and charts

Building TIV Total 17.99Bn Filtered 3.39Bn Total locations 66.28K

Claims automation



Possible automation within the Property Risk mgt value chain e.g. Insurance Claims



Rapid Damage Assessment

A single platform to predict, prepare and respond with agility

01

Pre-Event

Predict

Strategise CAT Response

- Latest event track and footprint
- Probabilistic loss calculation & geographic distribution of impact

02

Real time

Prepare

Assessment Prioritisation

- Pre and post event image comparison
- Damage detection & classification based on AI

03

Post-Event

Respond

Minimise Claims OPEX

- Report generation & extraction
- Custom analysis for resource prioritisation

Closing remarks

Automation
investment Vs
RoI
where is it worth
investing?

KPIs Vs Value
measuring automation
success

Internal success
depends on
external support
and **community**
effort

Thank you!

Contact us



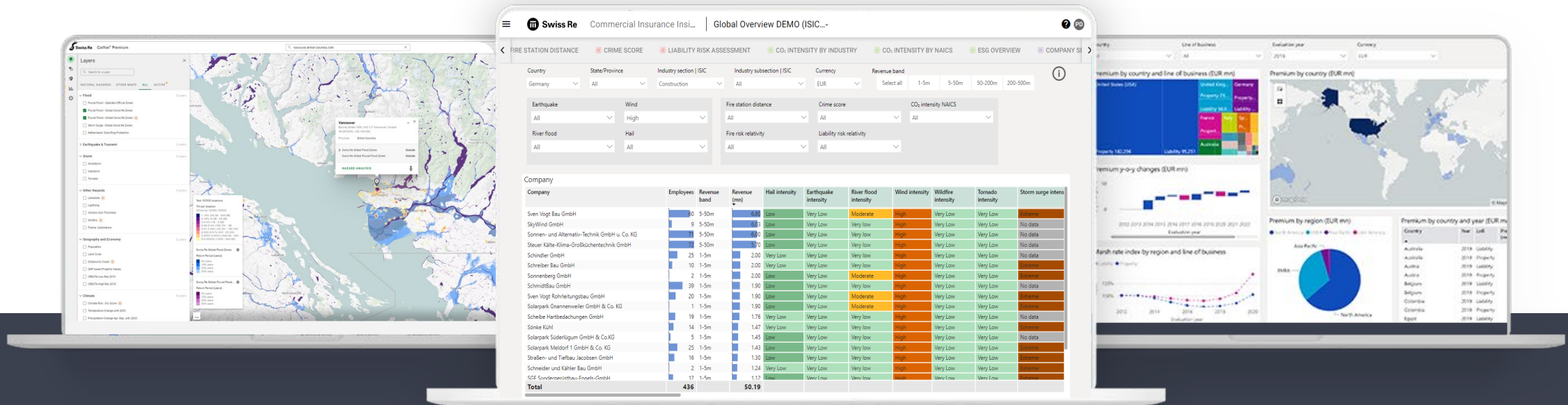
Amaryllis Mouyiannou, PhD
Lead Property Analytics EMEA
amaryllis_mouyiannou@swissre.com

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Swiss Re hazard, exposure, risk and market insights at your fingertips

Ease, speed & efficiency - 24/7 availability



Natural perils & hazard maps

Swiss Re's online natural hazard atlas. Visualises regional risk profiles and supports underwriting, location surveys, claims analysis, risk management and more.

Risk scores for man-made and natural perils, and sustainability risk assessment

Access Swiss Re's risk models for property and liability insurance to improve pricing and risk selection. Tap into Swiss Re's ESG and CO2 models to bring sustainability into P&C underwriting.

Exposure and market data for commercial insurance and retail property

Risk exposure data for commercial risks to assess market opportunities and to understand industry and location specific commercial insurance risks. Building characteristics, TIV and replacement cost information at location level for property.

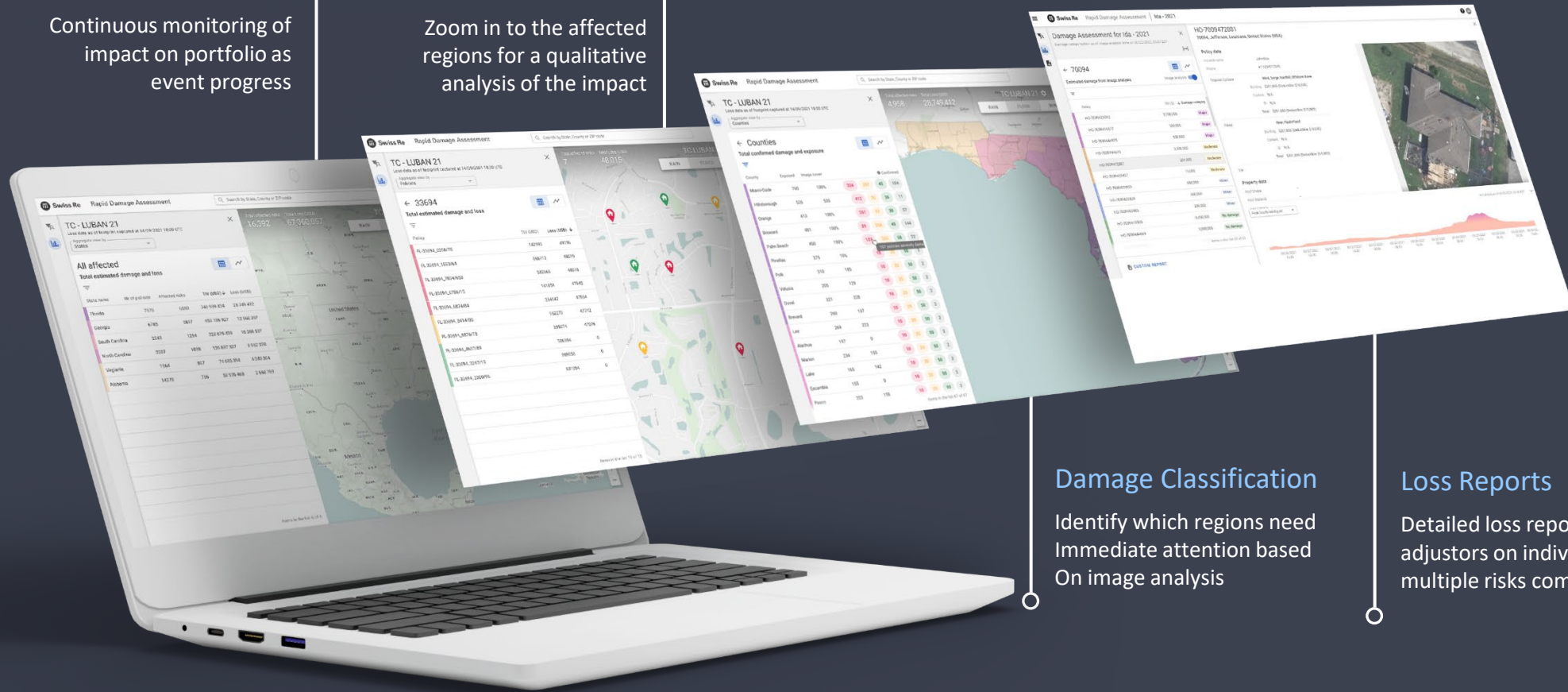
For better claims management and smarter response to large NatCat events

Impact Monitoring

Continuous monitoring of impact on portfolio as event progress

Map Analysis

Zoom in to the affected regions for a qualitative analysis of the impact



Damage Classification

Identify which regions need immediate attention based on image analysis

Loss Reports

Detailed loss report for adjustors on individual or multiple risks combined



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LEVERAGING CLOUD COMPUTING AND THE DATA LAKE FOR REAL-TIME VESSEL LOCATION TRACKING AND ANALYTICS IN MARINE RE-INSURANCE

James Smith, PhD
Vice-President, Global Strategic Advisory
Model Development Team
Guy Carpenter, London
james.d.smith@guycarp.com

Who am I

(James Smith)

- Career change age 30
- Academic administration & management → geospatial
- MSc in GIS (University College London)
- PhD in Environmental Science (King's College London)
- Coding, cloud computing, big (geospatial) data, Github, databases etc.
- Air quality researcher → Guy Carpenter (Model Dev team)
- Still learning about the industry
- London / Sheffield
- Cycling, running, football + 4 year olds



Outline

(The things I'm going to talk about)

- Guy Carpenter – Model Development Team
- Guy Carpenter - Marine & energy specialty
- The problem
- Existing solutions
- Building our solution
- Cutting our losses
- Migrating to the cloud
- Why it's better
- How it's used
- Why it's great
- What's next
- What we learnt

Guy Carpenter – Model Development Team

(Some great people)

- What we do:
 - Develop models and solutions to fill gaps for un-modelled perils and regions
 - Provide alternative views
 - Develop risk scores
 - Geounits
 - Ad-hoc solutions i.e. vessels
 - Around 20 staff around the world specialising in various areas (flood, quake, typhoon, wildfire etc)
- What I do:
 - Geospatial data, automation, cloud computing, R, Python, RShiny apps, challenging data, rasters, vectors etc.
 - I support the team (GIS, databases, coding, cloud) + my own projects (vessels, fluvial risk scores, pluvial risk scores)

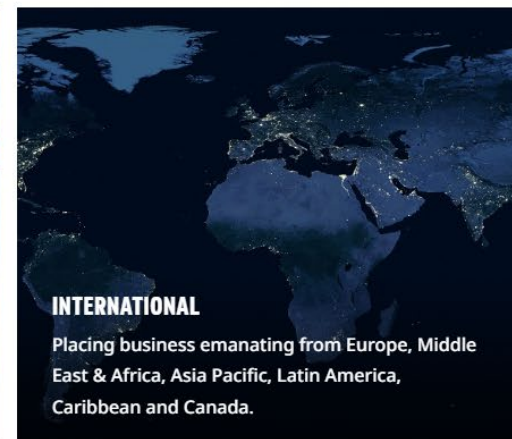
Guy Carpenter - Marine & energy specialty

(More great people, but focused on marine not tech)

- Over 70 colleagues - London + New York + Singapore
- Supporting our marine re-insurance clients
- Portfolios tend to be lists of vessels

YOUR BUSINESS NEVER LEAVES OUR HANDS

Your account and claims management are entirely in-house: when you work with Guy Carpenter, you get Guy Carpenter. Tight integration ensures that the full weight of our network is brought to bear should any issues arise. The practice is organized by these operating regions.



The problem

(They keep moving)

- Insuring vessels is difficult when you don't know where they are or where they have been.
- Leads to simplified fleet-level policies.
- Our marine brokers and analysts wanted to know more.

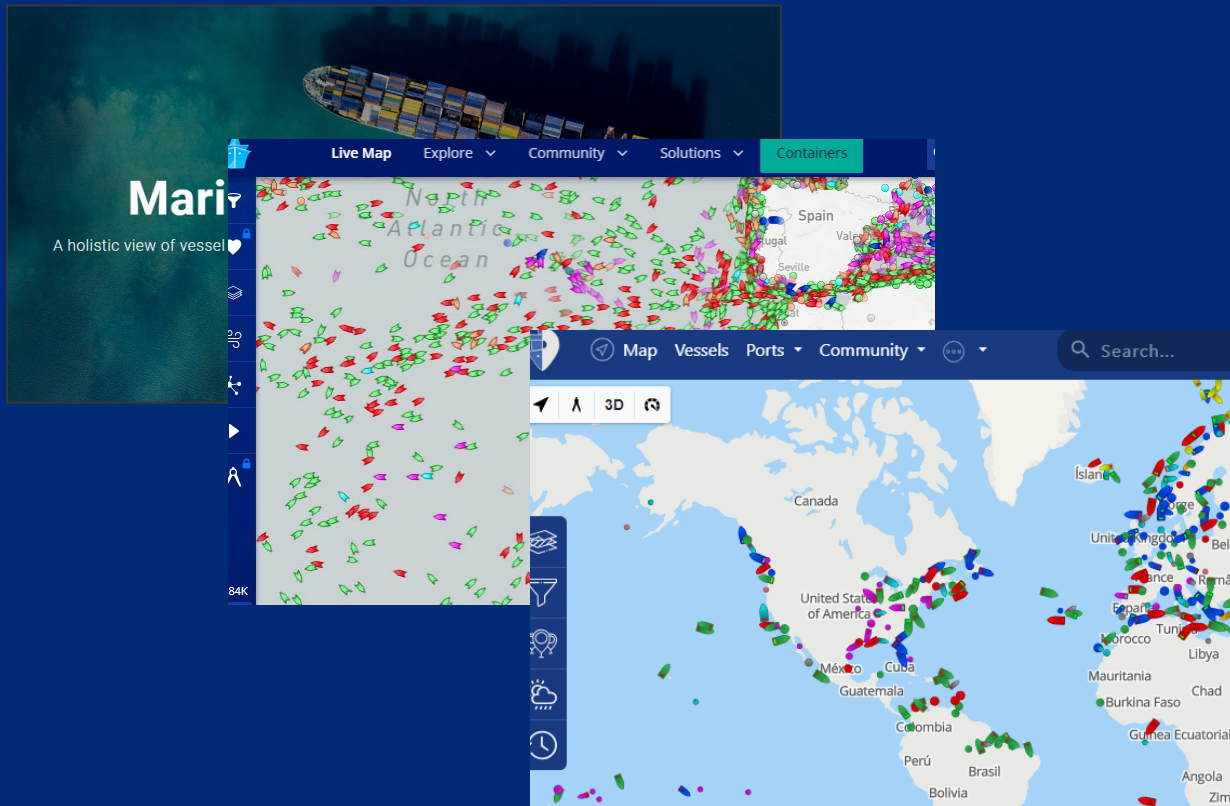


Arr' they at high risk of piracy?



Existing solutions

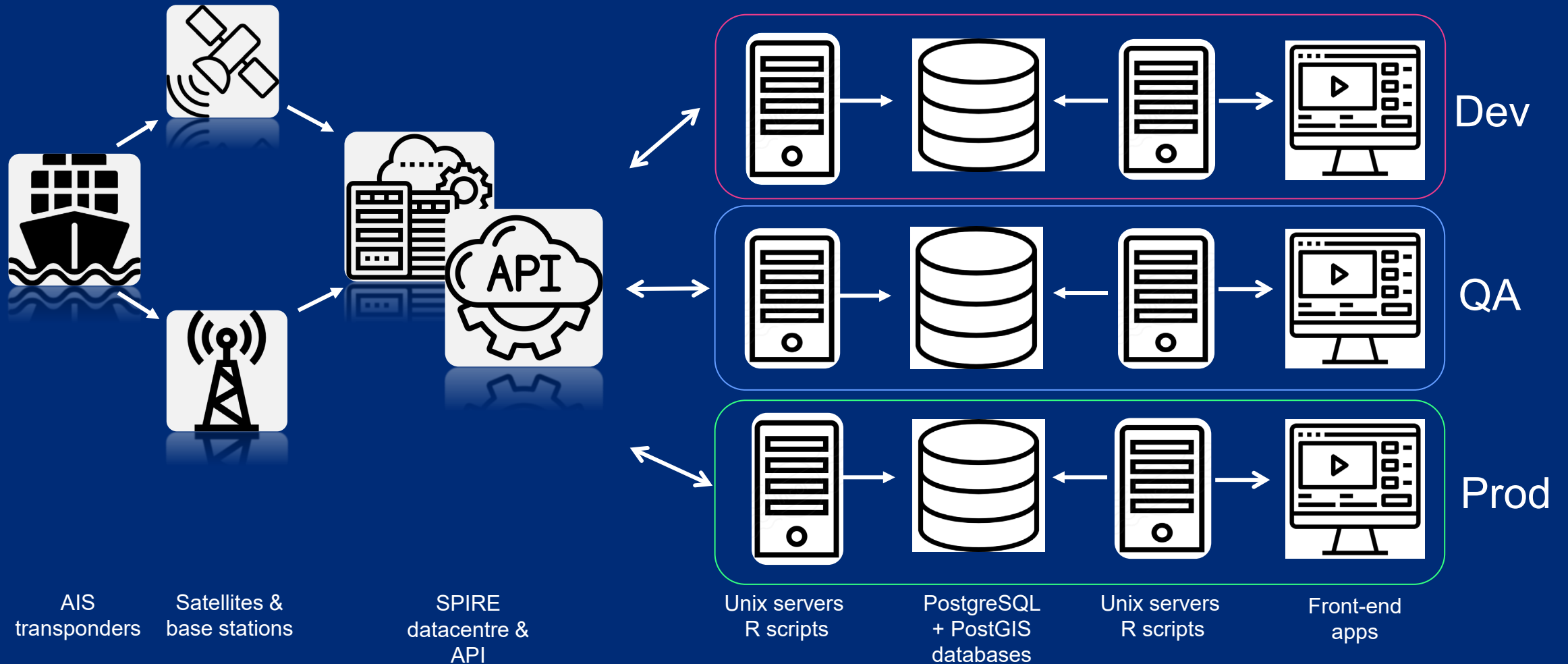
(Why we went 'in house')



- Custom queries
- Custom geographies
- Linkage (portfolios, other internal datasets)
- Ability to serve through our in-house platforms
- Ability to derive additional products/analytics

Building our solution

(A bit of a mess)



Cutting our losses

(It kept breaking down)



Data volume



Server reboots & patches



Monitoring, alerts, emails



Languages



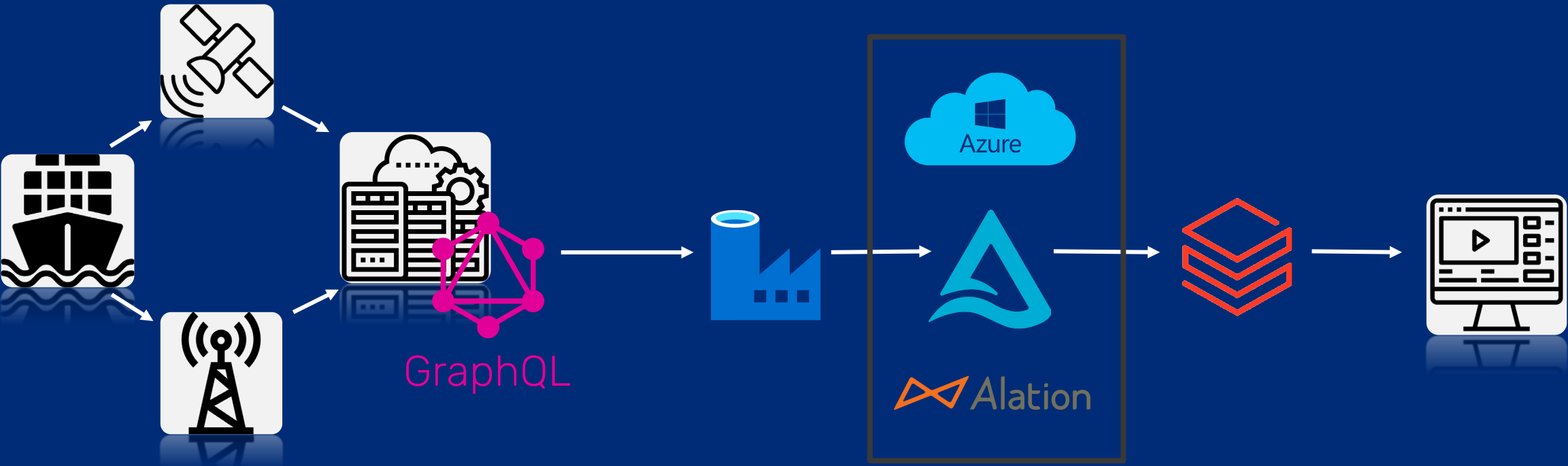
Speed



Points of failure

Migrating to the cloud

(Starting from scratch)



AIS transponders

Satellites & base stations

SPIRE datacentre & GraphQL

Azure data factory

Azure cloud Delta Lake Alation

Databricks notebooks & compute

Front-end tools

Why it's better

(Mostly because it sounds cool)



Cost



Issues / alerts



Integrated dashboards



Scalable storage



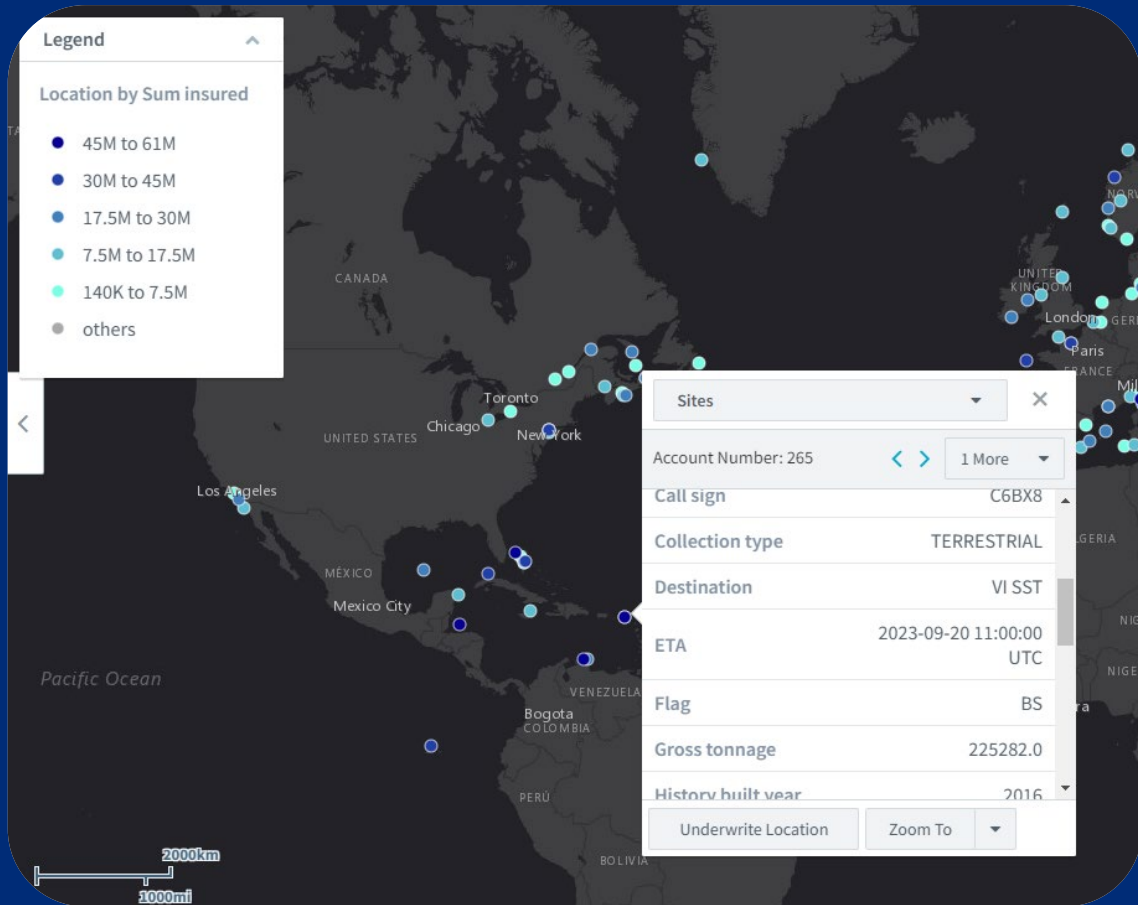
Scalable compute



Uptime & resiliency

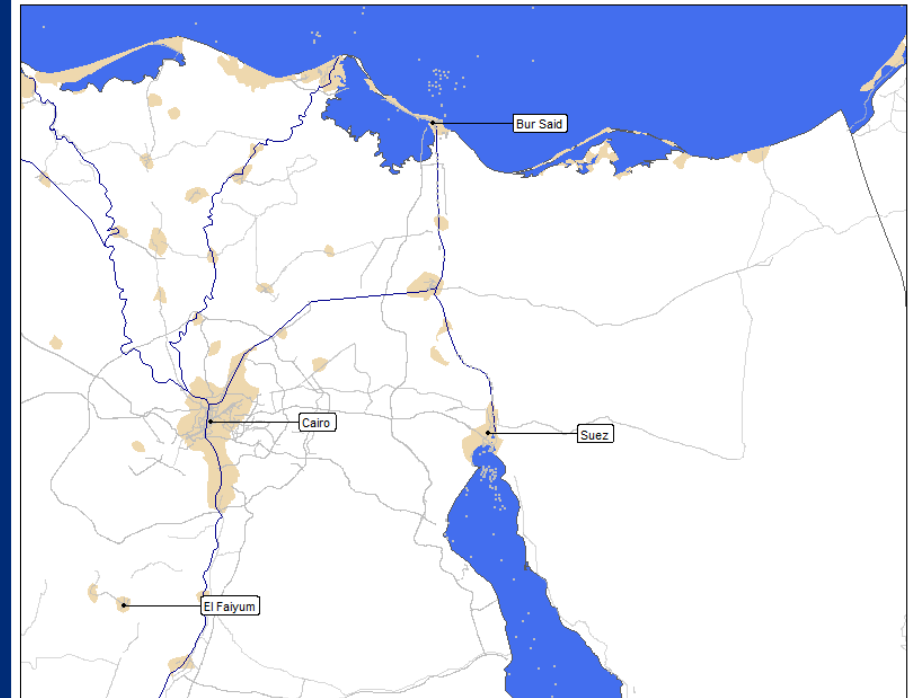
How it's used

(Why is my yacht in the Philippines?)



The Suez Canal

20 March



Date source: Guy Carpenter AIS data

How it's used

(Cruise liner party in Manilla!)



INSIGHTS | MAY 2020

Guy Carpenter Vessel Accumulation Observations and Analysis

Impact Of Covid-19 On Marine (Re)Insurance Exposure



As the far-reaching impacts of the COVID-19 pandemic continue to accelerate leading to considerable uncertainty in almost every global industry, Guy Carpenter have continued their considerable efforts to monitor the potential effects to marine insurance and the wider shipping industry in order to provide some clarity during this unprecedented period of uncertainty.

Guy Carpenter have powerful market leading proprietary marine analytics tools which enable accurate vessel tracking, vessel aggregation and accumulation analysis to be conducted efficiently. The tools have made key observations that Guy Carpenter would like to share with the Marine (Re) Insurance industry.

Whilst considerable attention has been given to Miami in the discussion around cruise vessel aggregation, Guy Carpenter's

GC AdvantagePoint®



The industry's most advanced risk analysis and visualization platform helps companies translate vast amounts of data to better understand risk exposures, maximize returns and take advantage of opportunities hidden within their portfolios.

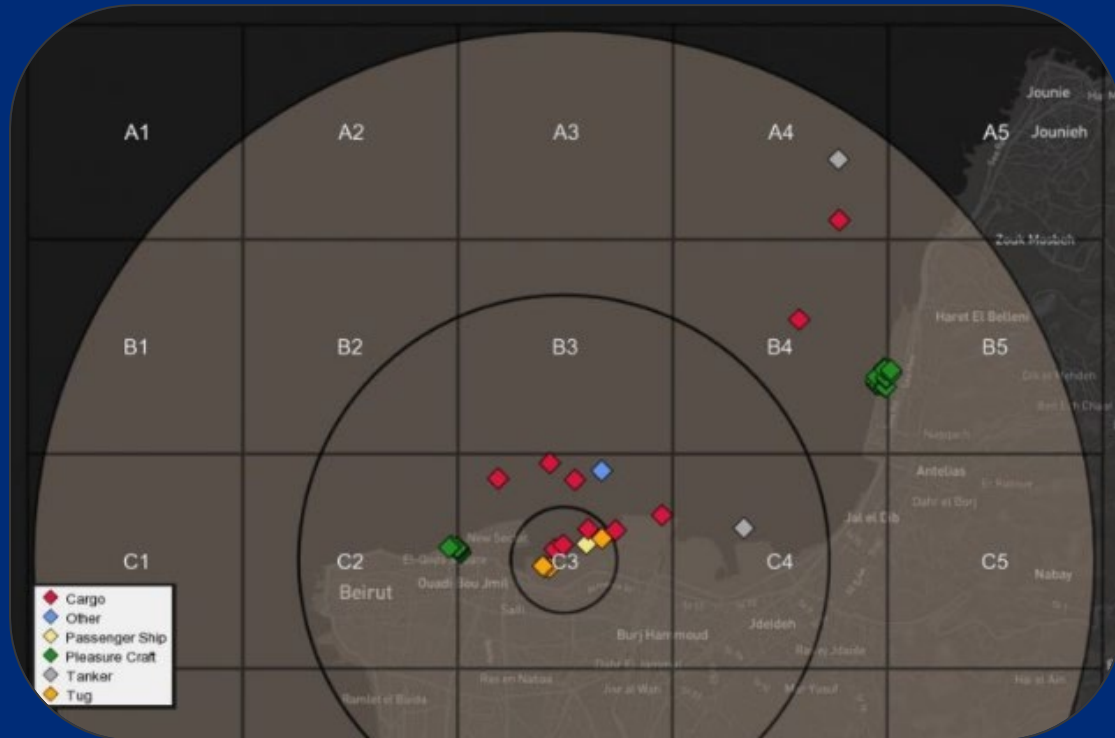
SALIENT FEATURES

- Live vessel tracking



How it's used

(I hope we've no ships in Beirut)



Beirut Vessel Positions at 15:20 UTC (18:20 Beirut time) 04 August 2020 GUY CARPENTER

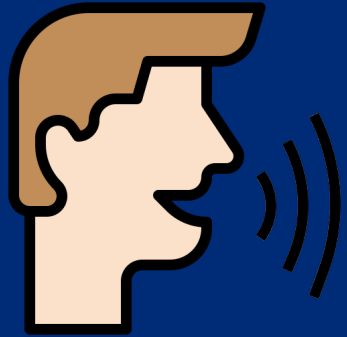
Vessel	Grid	Ship Type	Ship Type Detail	Distance (km) from Explosion
RAOUF H	C3	Cargo	Multi-purpose Carrier	0.3
MERO STAR	C3	Cargo	Multi-purpose Carrier	0.3
BALTAGI 19	C3	Tug	Tug	0.3
BALTAGI 20	C3	Tug	Tug	0.4
BALTAGI 17	C3	Tug	Tug	0.4
ORIENT QUEEN	C3	Passenger Ship	Passenger Ship	0.5
JOURI	C3	Cargo	Pure Car Carrier	0.7
DPS TRAMONTANE	C3	Tug	Tug	0.8
CITY OF ROME	C3	Cargo	Pure Car Carrier	1.1
PACIFIC M	C3	Cargo	Container Ship	1.5
TRANSPORTER	C3	Other	Roll-on Roll-off	1.8
WHITE SHARK	C3	Cargo	Bulk Carrier	1.9
LINA	C3	Pleasure Craft	Motor Boat	2.0
FK HATICE	C3	Cargo	General Dry Cargo	2.0
MY BBU	C3	Pleasure Craft	Yacht	2.0
LAYALENA	C3	Pleasure Craft	Yacht	2.0
LAMONA	C3	Pleasure Craft	Yacht	2.0
KING HENRY XI	C2	Pleasure Craft	Motor Boat	2.0
CMA CGM LYRA	C3	Cargo	Container Ship	2.0
SIMA	C2	Pleasure Craft	Yacht	2.1
MY LE PHENICIEN	C2	Pleasure Craft	Pleasure Craft	2.2
DUKE I	C4	Tanker	Petroleum Product Tanker	3.4
BFP GALAXY	B4	Cargo	Container Ship	6.3
QUINDIA	B4	Pleasure Craft	Motor Boat	6.8
MAEVA	B4	Pleasure Craft	Yacht	6.8
LION EIGHT	B4	Pleasure Craft	Yacht	6.8
BLUE DIAMOND	B4	Pleasure Craft	Yacht	6.8
MY SAMIRA	B4	Pleasure Craft	Pleasure Craft	6.8
ZOUZOU	B4	Pleasure Craft	Pleasure Craft	6.9
DARINA - SI	B4	Pleasure Craft	Yacht	6.9
M Y ACE	B4	Pleasure Craft	Yacht	7.0
BINGO	B4	Pleasure Craft	Pleasure Craft	7.0
MY WAY	B4	Pleasure Craft	Pleasure Craft	7.0
THALYSSA	B4	Pleasure Craft	Motor Boat	7.0
MY SUE	B5	Pleasure Craft	Pleasure Craft	7.1
MY BOUT TIME	B5	Pleasure Craft	Pleasure Craft	7.1
MCHICAN	A4	Cargo	General Dry Cargo	8.3
BALTIC MONARCH	A4	Tanker	Petroleum Product Tanker	9.2

“There is still substantial uncertainty around the insured losses but Guy Carpenter’s early analysis suggests the total combined hull, cargo and port facility losses should be within USD 250 million. We will continue to monitor this, as more information becomes available to us.”

Why it's great

The broker and analytics view

“marine vessel work has put GC at the sharp end of marine data insights” [Broker]



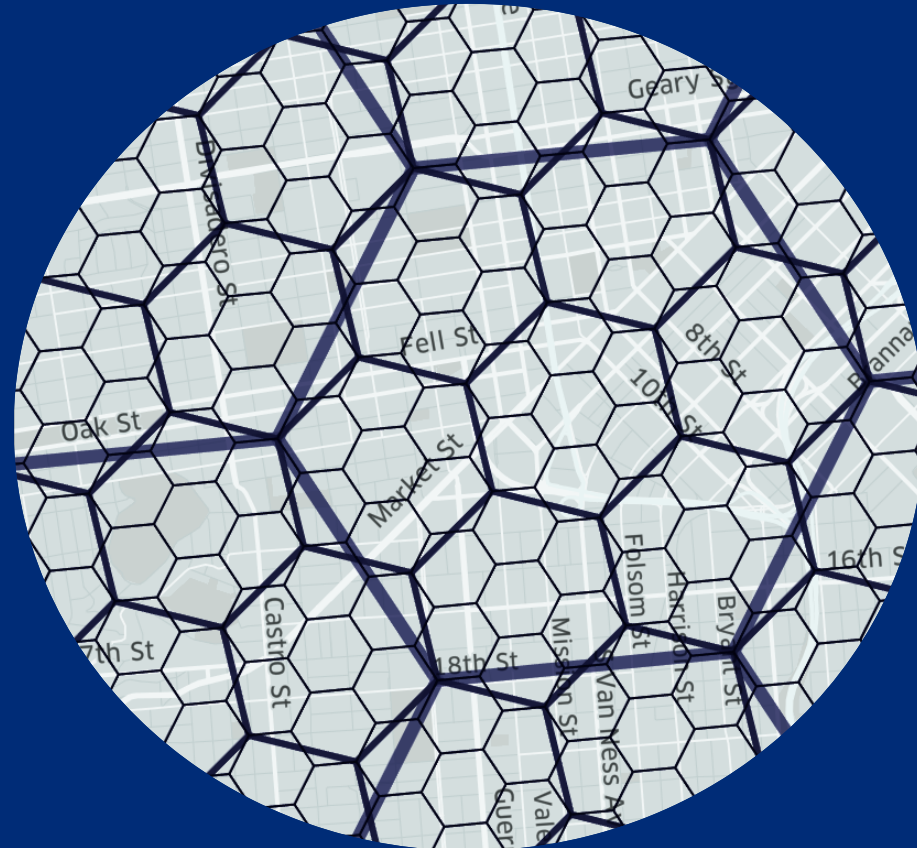
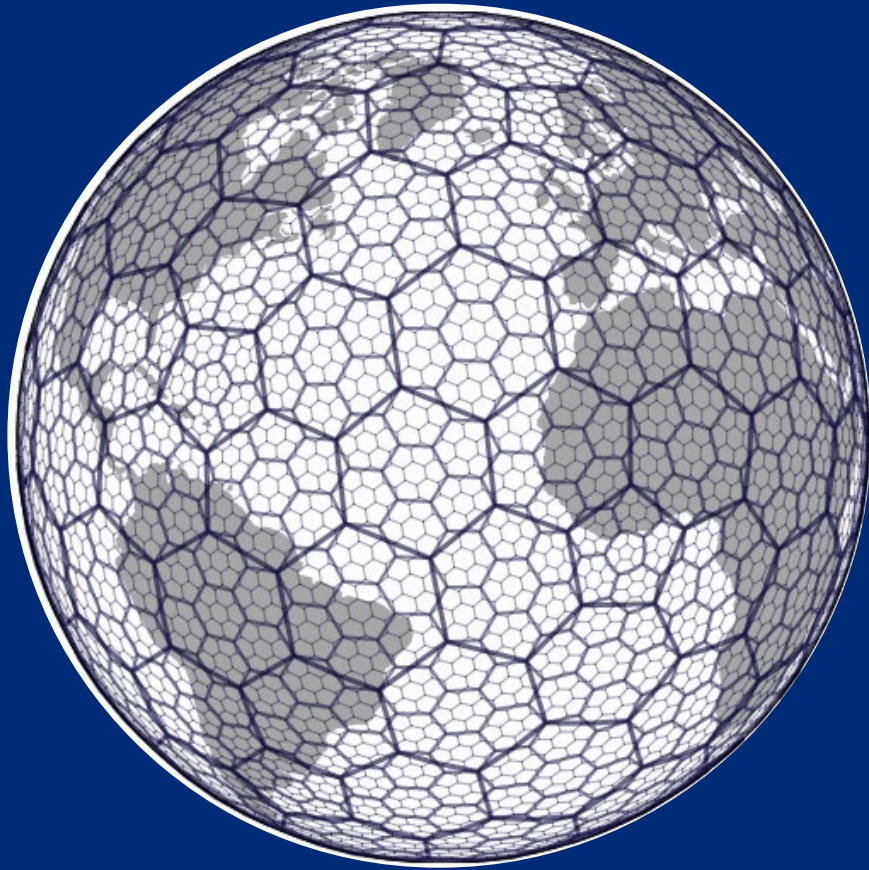
“The RFP we won was strongly influenced by our marine data insights” [Broker]

“It allows clients to better understand the intricacies of their own portfolios” [Actuary]



What next

(Hexagons?)



What we learnt

(Sometimes it's best to start again)

- Under-estimated size of data: storage and processing
- Lots about marine data (Vessels, hull coverage, cargo, ports, exclusive economic zones etc.)
- Networked with areas of the company we hadn't before (Marine, IT, Data, Infrastructure)
- How to use new technologies!
 - ADF
 - Databricks
 - Data Lake
- Started as a POC then became crucial BI tool. Engage with core services earlier.

Planes?





Changing cat modelling requirements

Simos Koumoutsaris
Global Head of Cat R&D
26/09/2023

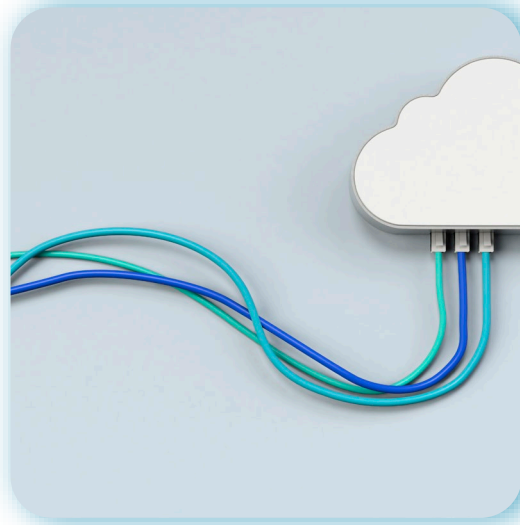
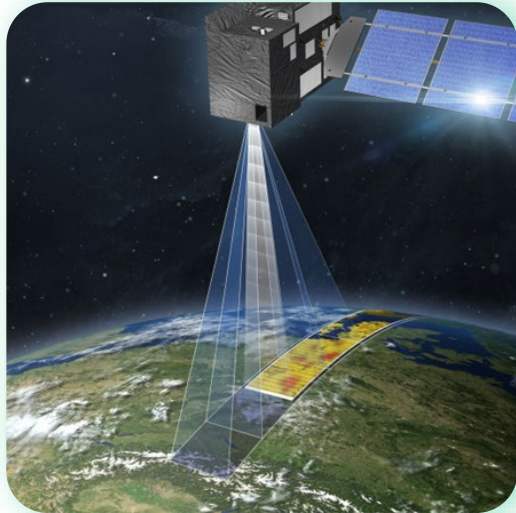
ISCM meeting, Zurich

Outline

Changing cat modelling requirements

New Data

LiDAR, Satellite, High-Res climate data

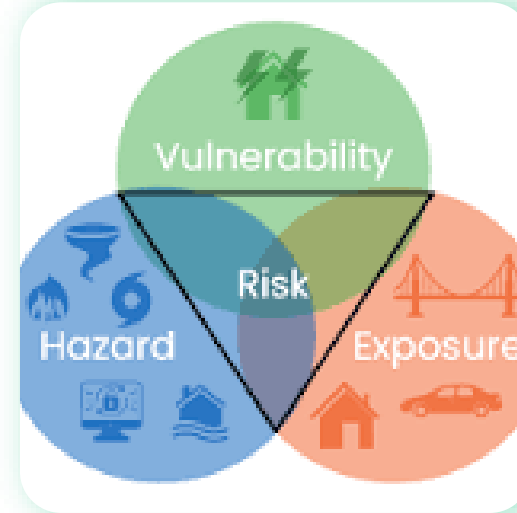


New Science & Technology

Machine Learning, Cloud computing, AI

New Models & Tools

Platforms, Cat Models, Data Standards

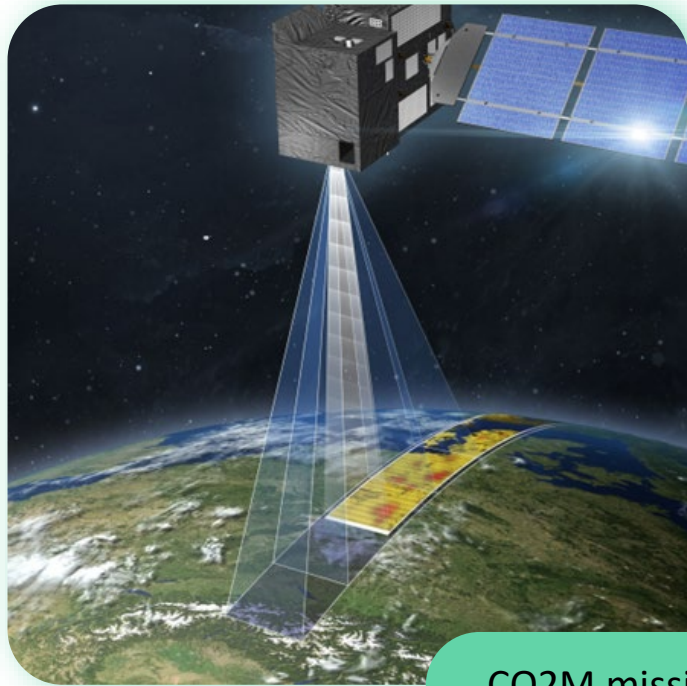


New Challenges & Opportunities

Model evaluation, transparency, efficiency, improved View of Risk

Changing cat modelling requirements

New Data

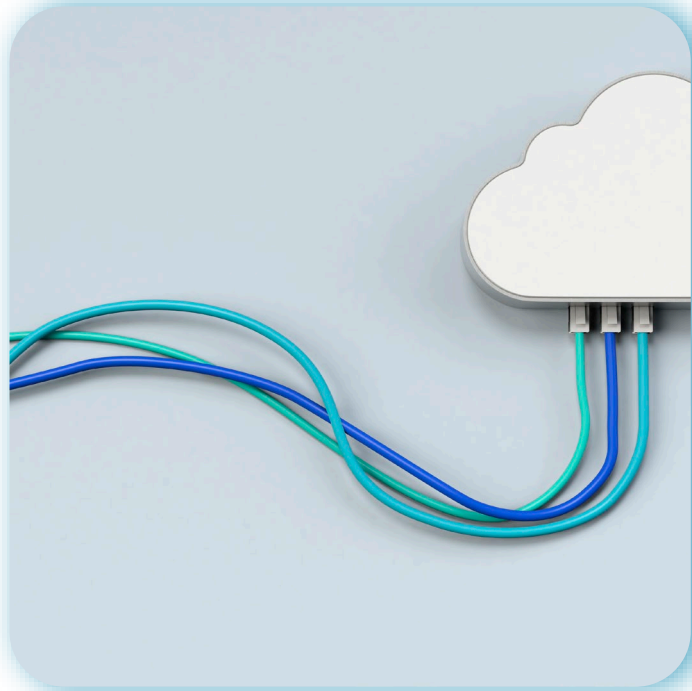


CO2M mission

- LiDAR for building heights, flood modeling, etc.
- Satellite data (flood monitoring, fire extent, CO2 emissions, etc.)
- High-resolution climate model and reanalyses data ([CORDEX-CMIP6](#), [NEX-GDDP-CMIP6](#), [Reanalyses](#), etc.)

Changing cat modelling requirements

New Science & Technology (1)

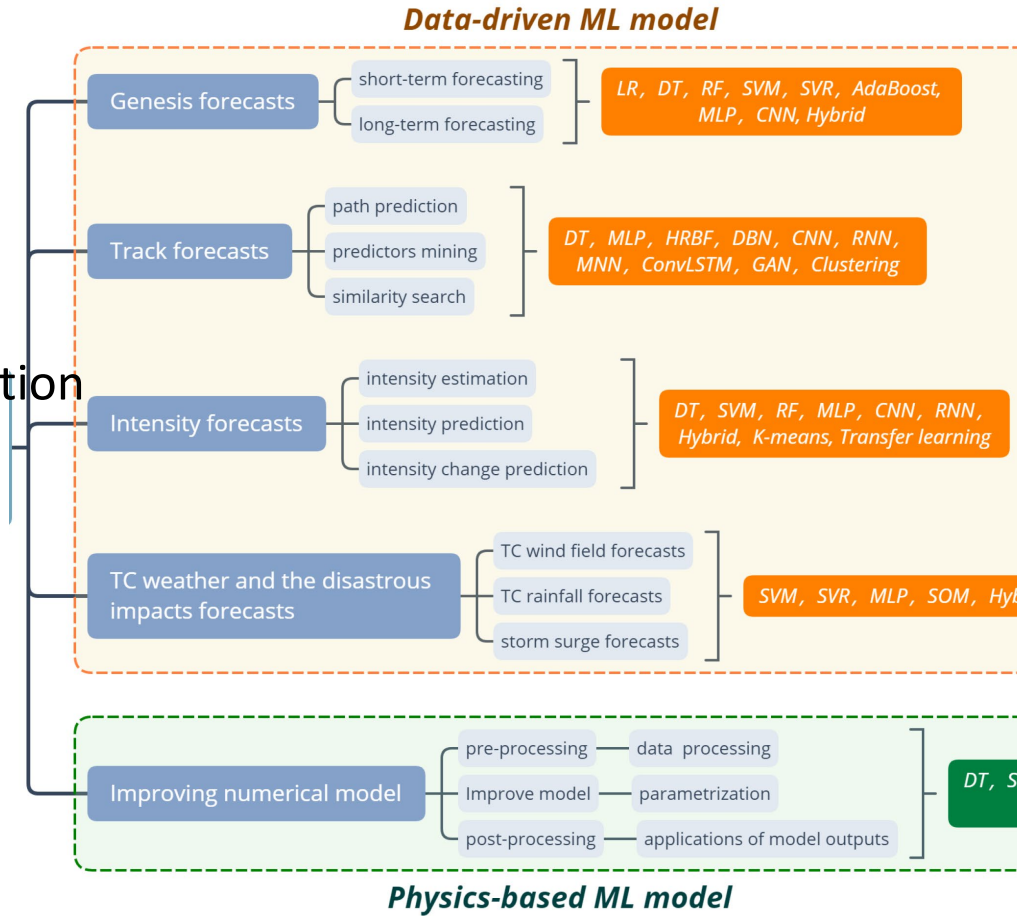


● Machine Learning

- Model Development
- Exposure Enhancement
- Data capture & data validation

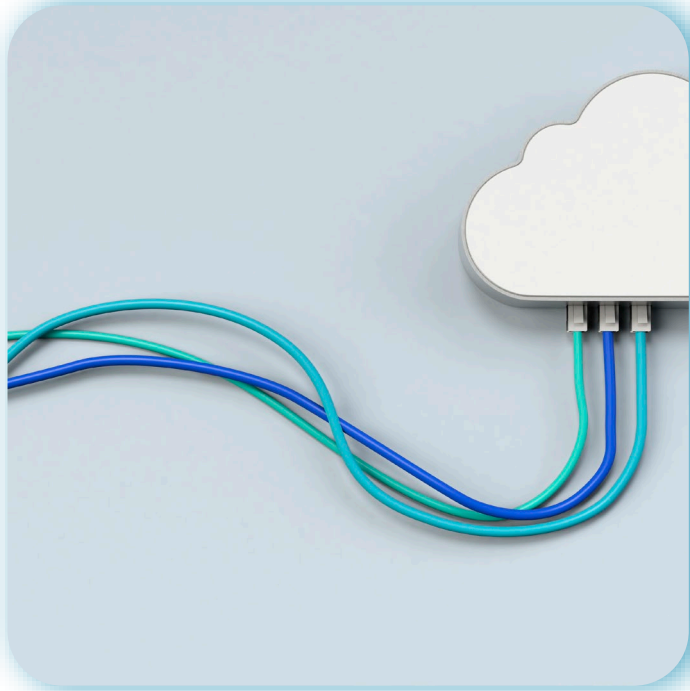
● See review papers: [de Burgh-Day and Leeuwenburg, \(2023\)](#), [Chen et al., \(2020\)](#)

ML used in TC forecasts



Changing cat modelling requirements

New Science & Technology (2)



- Cloud computing (Databricks, Data Lake, etc.)
 - Cost Optimization
 - Efficiency
 - Innovation
- R, Python, GitHub, Azure DevOps

Cloud regions

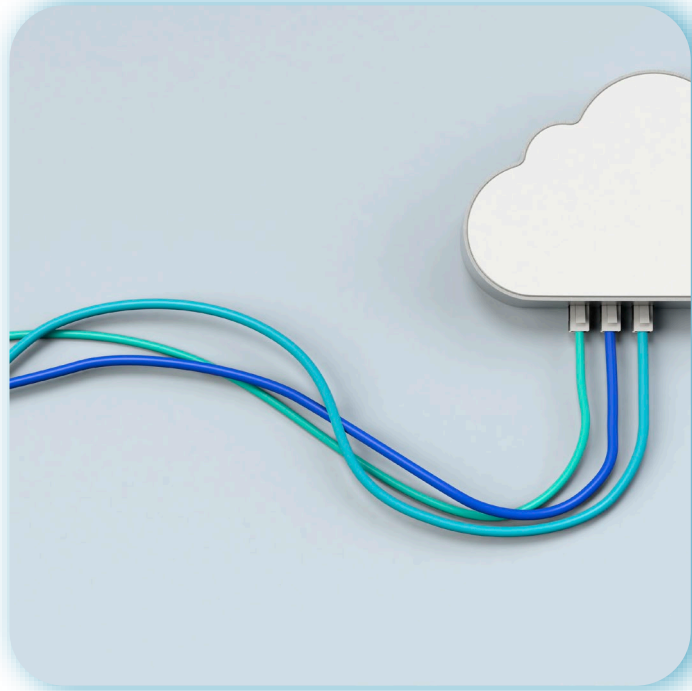
● Azure ● AWS ● Google



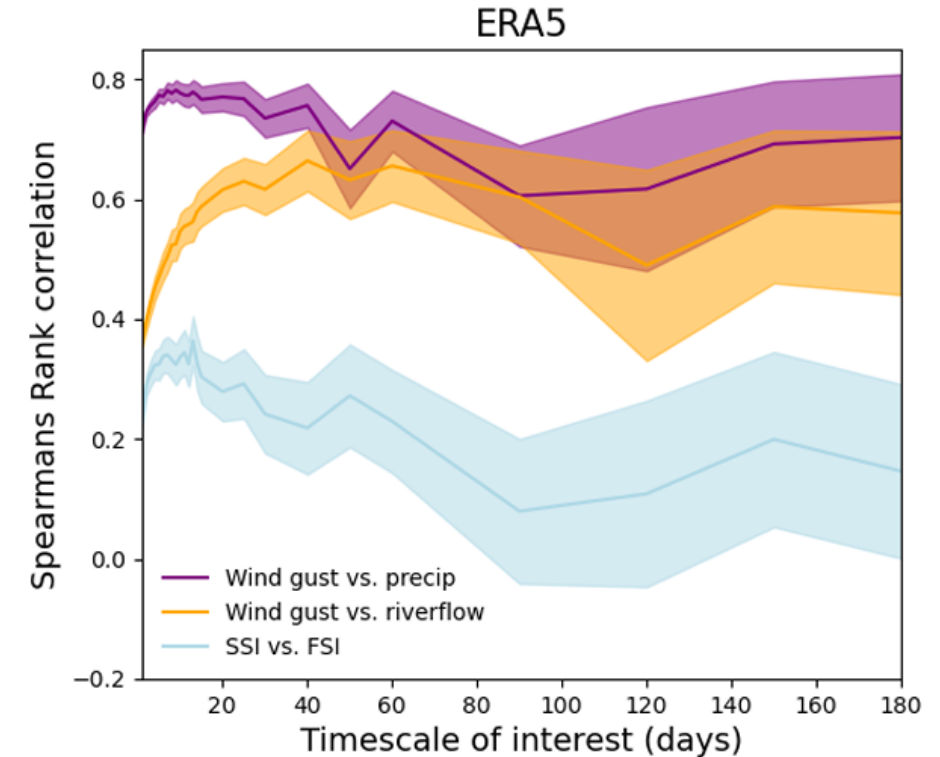
Source: <https://www.databricks.com/company/partners/cloud-partners>

Changing cat modelling requirements

New Science & Technology (3)



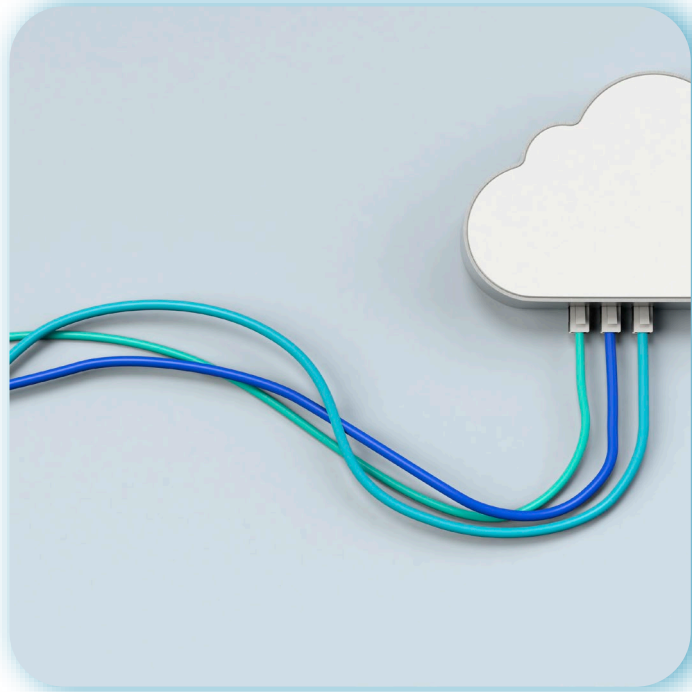
- More “physics” in Cat Models
 - Integration of GCMs and Reanalyses
 - Non-Stationarity
 - Compound events



Source: [Bloomfield et al. 2023](#)

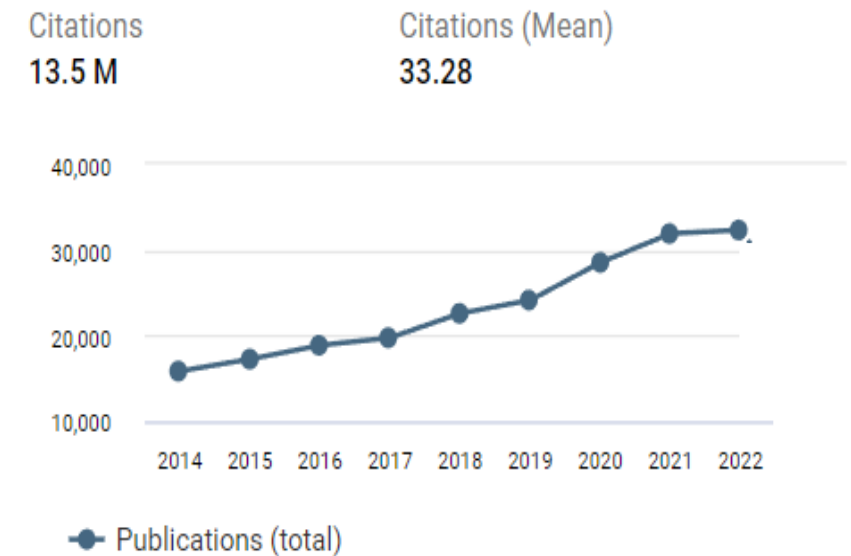
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New Science & Technology (4)



- Follow developments in Science and the Nat Cat model universe.
- AI can help: find papers, filter study types, find insights, summarizing and more.
 - Consensus.app, Elicit.org, Scite.Ai

Number of publications about “Earth Sciences”+“Extreme Events”



Source: <https://app.dimensions.ai/>

Changing cat modelling requirements

New Models and Tools



- Specialized and/or regional cat models via OasisLMF
- Faster updates of models or model components
- Platform updates (e.g., OasisLMF, Verisk NextGen, RMS RiskModeler,)
- Formats (e.g., Parquet)

Changing cat modelling requirements

New Opportunities and *Challenges*



- The cloud provides scalability and the ability to add capacity during periods of peak usage.
 - Performance
 - Cost-effective
- *Different input and output formats, financial conditions coding, UIs, financial engine logic (sampling, disaggregation, correlation, etc.)*

Changing cat modelling requirements

New Opportunities and *Challenges*



- Multi-Vendor modelling strategy
 - Access to more models
 - Comprehensive View-of-Risk
- *More models + more complex & bigger*
- *AI's black-box problem?*

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New Opportunities and *Challenges*



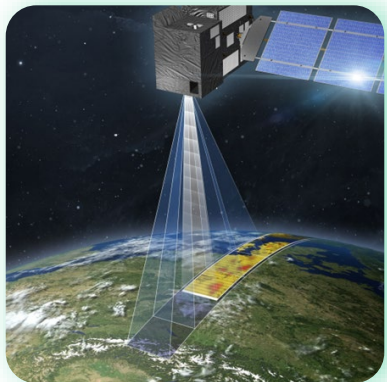
LOSS MODELLING
FRAMEWORK



- Effective Multi-model evaluations:
 - Trial and compare models prior to purchase
 - Ability to compare models with the same underlying conditions (i.e., same portfolio, same platform, same financial calculation models, etc.)
- ❖ *Transparency*
- ❖ *ODS and OasisLMF is key!*

Changing cat modelling requirements

Conclusions



- Required skills for future cat managers:
 - Stay on top of the latest developments in Science and the Nat Cat model universe
 - Understanding of financial engine and financial condition implementation
 - Statistics/ML + AI tools
 - Cloud computing



Thank You

Simos Koumoutsaris

Zurich, 26/9/2023

An aerial photograph of a lush green forest. A dirt path winds through the trees, and a dark blue lake is visible on the left side. The text 'SCOR' is overlaid in the center in a white, stylized font.

SCOR

The Art & Science of Risk

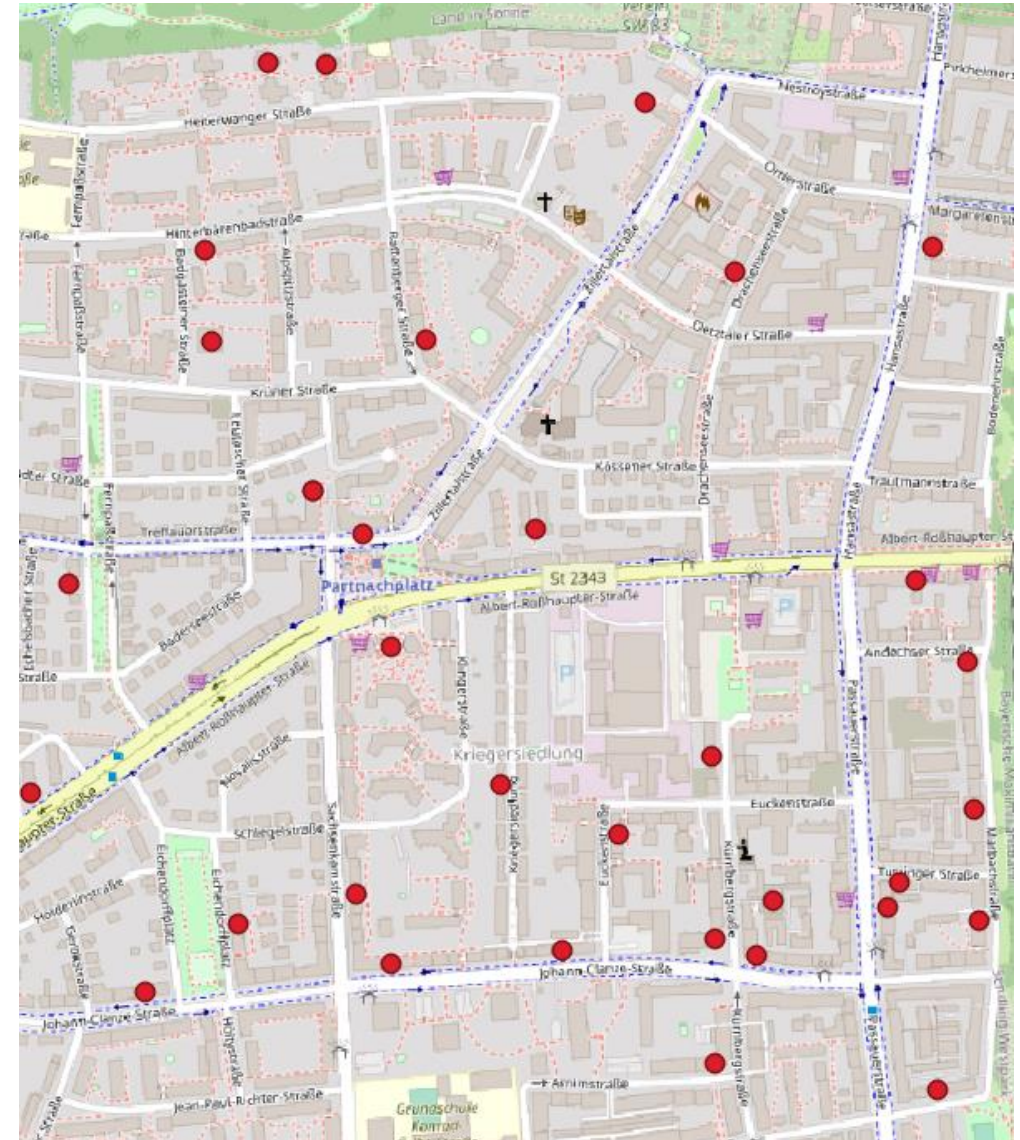


RenaissanceRe

Data Enrichment: Enhancing exposure data with remote sensing

Mark den Brok
RenaissanceRe

- Trend that exposure data is becoming more granular
 - Submissions for several European countries now at address level
 - With proper geocoding, one can relate these to individual properties
 - Partly driven by model development e.g. flood/hail models reach higher spatial resolution
 - But – better data can (should) also drive model development
- Details of exposure do make a difference in case of losses
 - Ideally would like to know all these details
 - And their time evolution



Examples of recent hail damage



Roof type matters



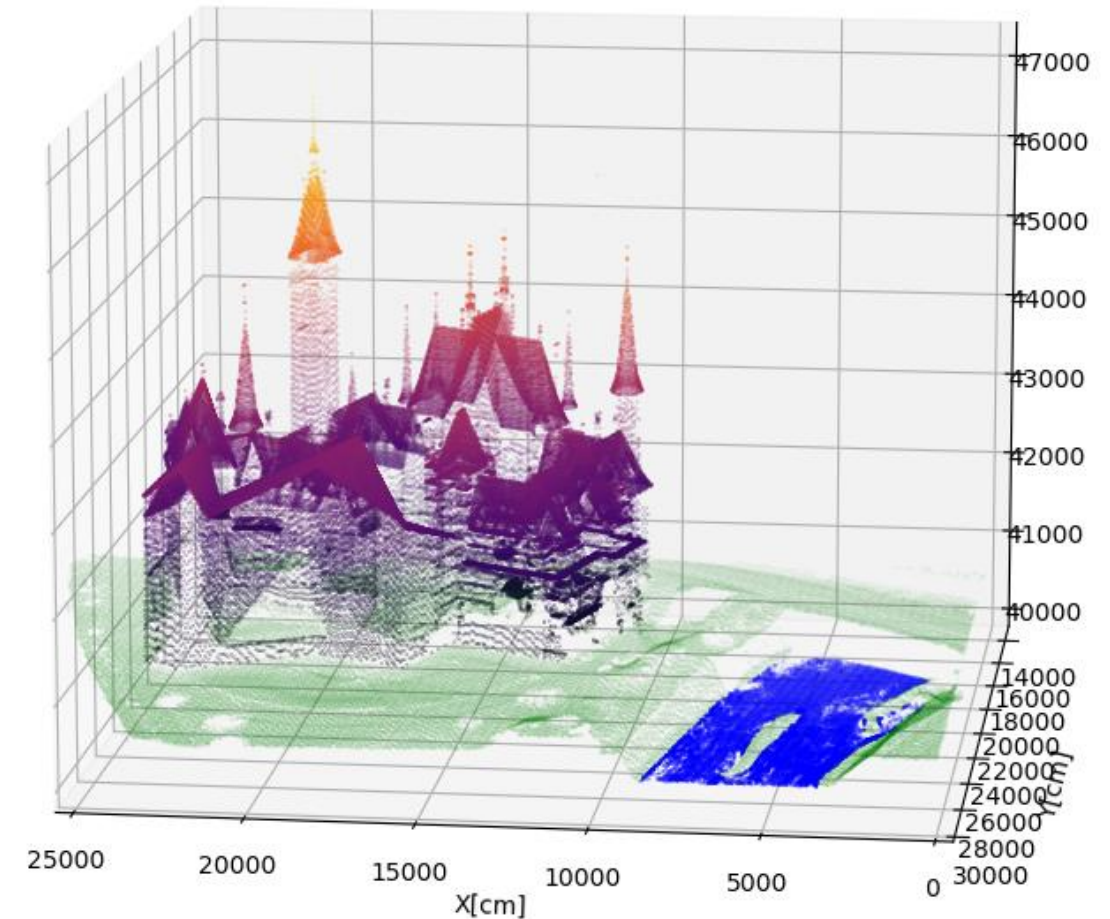
- Insurance conditions:
 - Exact location (coordinates)
 - Total sum insured/limits/deductibles
 - #policies (dwellings vs. buildings)

- Building characteristics:
 - Building height
 - Building type/LOB (SFD/MFD/Commercial/Industrial/Agricultural)
 - Roof type (flat/gable)
 - Building/roof material
 - Building year
 - Solar panels/roof windows/window blinds
 - ...

- Combination of Airplane + laser pulses
- Reflection time is a measure of distance
- Typical uncertainty ~10-20 cm
- Depending on type of data, can also be used to identify water, vegetation
- Note: sometimes other data are available (cadastre or orthographic imaging, but not always superior)



- Shapes of roofs:
 - Straightforward to determine the pitch angle of a roof
 - Applications in e.g. wind vulnerability
- Building heights:
 - Derive number of stories
 - Applications in e.g. flood vulnerability and wind vulnerability
- May use as input for new models
- Assess/enrich submission data
- Orthogonal way to derive IED values
- Loss estimation for dead cat/life cat events



Data source: Bundesamt für Landestopografie swisstopo

LiDAR – Analyst skill requirements

- Typical file size per km² ~1 Gb
 - Processing for large areas requires some knowledge of pipeline generation

- Analysis rather straightforward, but does require some de-noising/classification
 - Knowledge of data manipulation
 - Elementary clustering algorithms (simple ML)

- Analysis has to be fast:
 - If your computer spends 1s per house, it would take 1 month to process a country the size of Switzerland

- High resolution (~10cm) imaging
- Roof types
- Solar panels



Image source: Bundesamt für Landestopografie swisstopo

- Some knowledge with CNN and image processing
 - What can go wrong? How to deal with biases
 - Lots of patience
- Some knowledge of handling big amounts of data
 - E.g. pipeline design
- More data out there:
 - Building age
 - Building footprints (MS Bing, google earth, OSM)

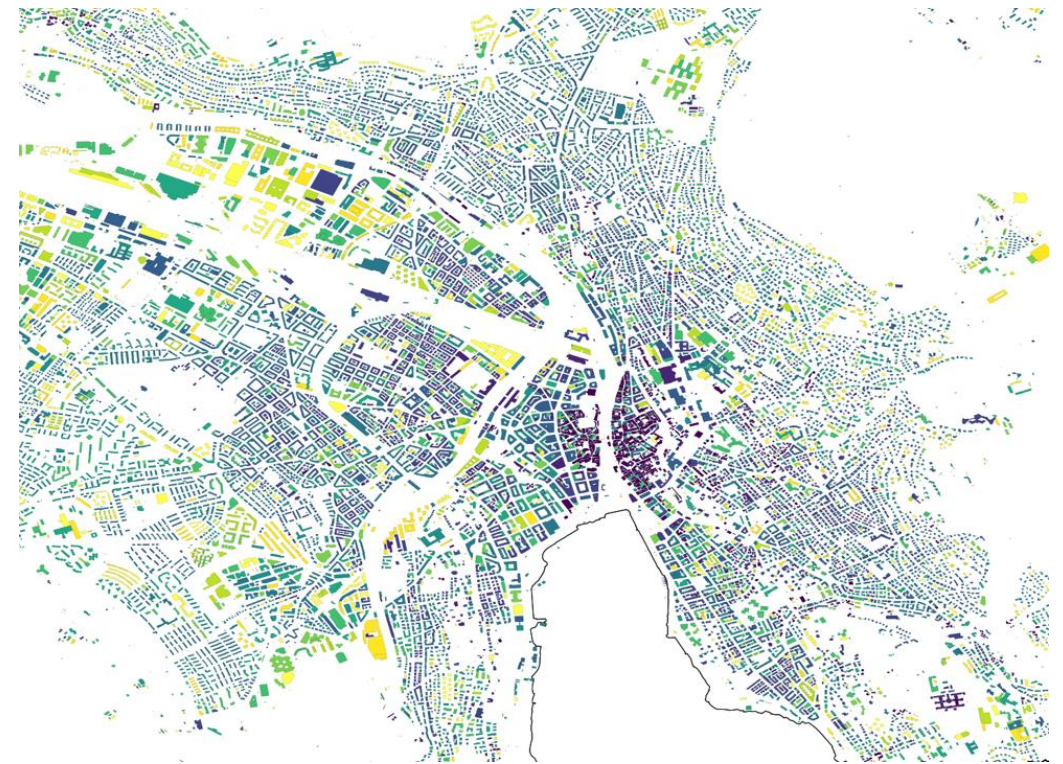


Image source: GeoLion (Kanton Zürich)

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