

Evolution of Reinsurance Pricing in a Disrupted Environment

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Adjunct Lecturer in Actuarial Science

Columbia University School of Professional Studies

Our Agenda

- Overview
- Bob
- What Risk
- From Whom
- How

Evolution and the Actuarial Model

- Aka Non-Stationarity
- New and evolving risk sources, methods of assessing and pricing and transferring
- Innovators and disruptors asking the actuaries for their opinions
- If the economy has evolved new forms of activity in the last three years, how can we say “I need ten+ years of loss history”
- We either need to adapt or risk irrelevance
- Because the business decisions and investments are being made as we speak, with or without us

Three Waves of Insurtech (*Explorations* May 2018)

- Digital Modernization
 - CX, UX, Insurability, Efficiency, VOC
 - Seamlessness
- Automation and Augmentation
- Loss Elimination
 - We will discuss both today

<https://ar.casact.org/actuarial-threat-assessment-of-insurtech-and-digital-disruption/>

Trucking XOL

Yesterday = Submission

- Loss run
- Driver listing with MVR's
- Power units
- Miles driven
- # Containers
- Qualitative info like safety programs

Today = Fleet Flow

- Telematics on Power units, drivers, routes driven
- Telematics on containers
- Telematics on drivers
- Supporting evidence for safety programs, including intervention and preventive technologies

Workers Comp XOL

- Claims analytics e.g., Clara Analytics
 - AI-driven claim analytics
 - Expedite simple claims, monitor complex claims, prevent claim escalations
 - Reduced attorney involvement
 - Dashboard analytics, cloud deployed, secure
- Is that Berquist-Sherman?



Workers Comp XOL

- Connected Workplace
 - Location including geo-fencing
 - Conditions
 - Impairment
 - Live video support
 - Complete motion and physics
- Full analytics dashboard
- Predictive AI for preventive measures

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Connected Worker Solutions

Innovensure Advisory Solutions



Marine

DISCOVER PRODUCT FINDER SHIP DESIGN LNG **SHIP INTELLIGENCE** SERVICES ABOUT MARINE CONTACTS AND SERVICE LOCATIONS CUSTOMER PRODUCT TRAINING NEWS

OVERVIEW

DISCOVER

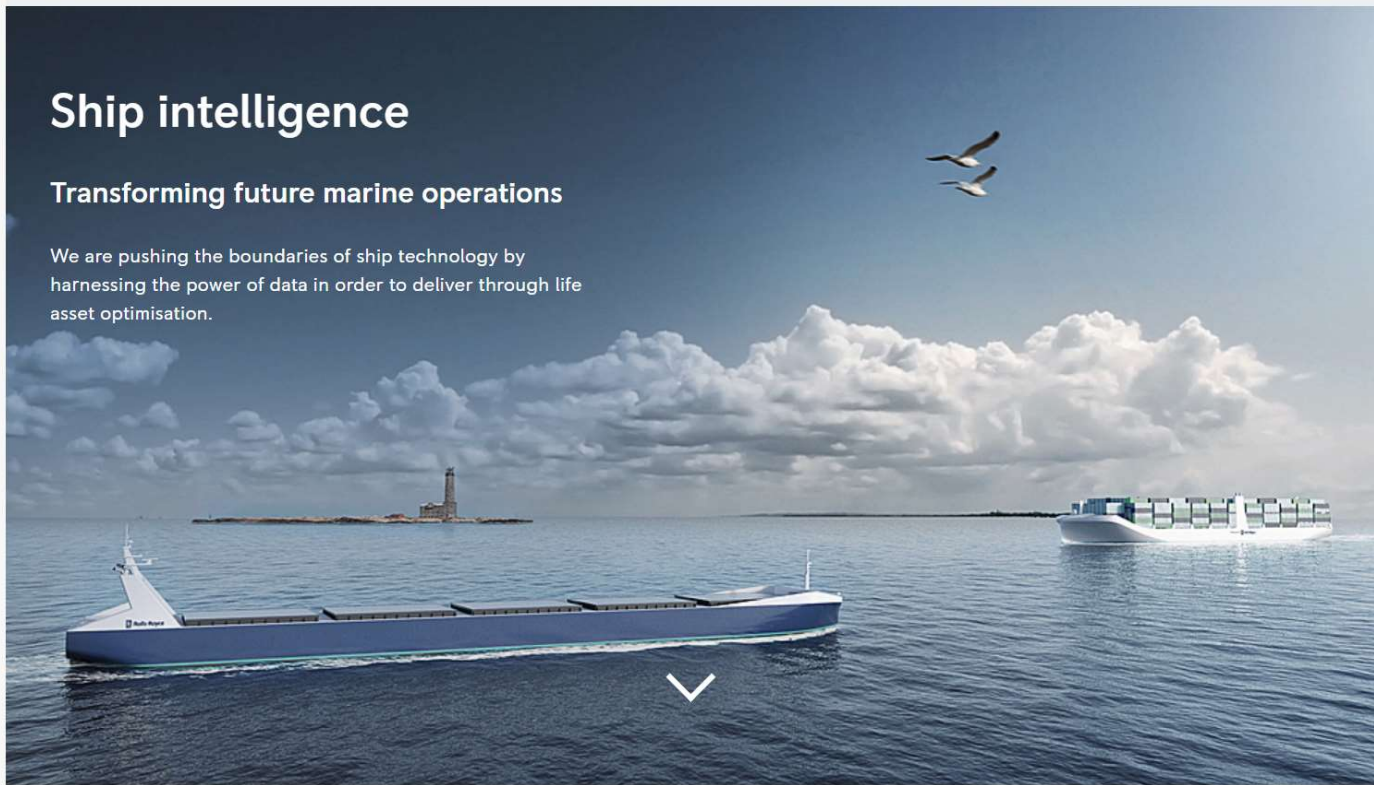
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TALK TO AN EXPERT


Ship intelligence

Transforming future marine operations

We are pushing the boundaries of ship technology by harnessing the power of data in order to deliver through life asset optimisation.



Innovensure Advisory Solutions



The Evolution of Re/insurance Pricing in a Disrupted Environment

Bob Weireter
Senior Treaty Casualty Underwriter
Swiss Re
CARe InsurTech
Brooklyn, New York
June 4, 2018

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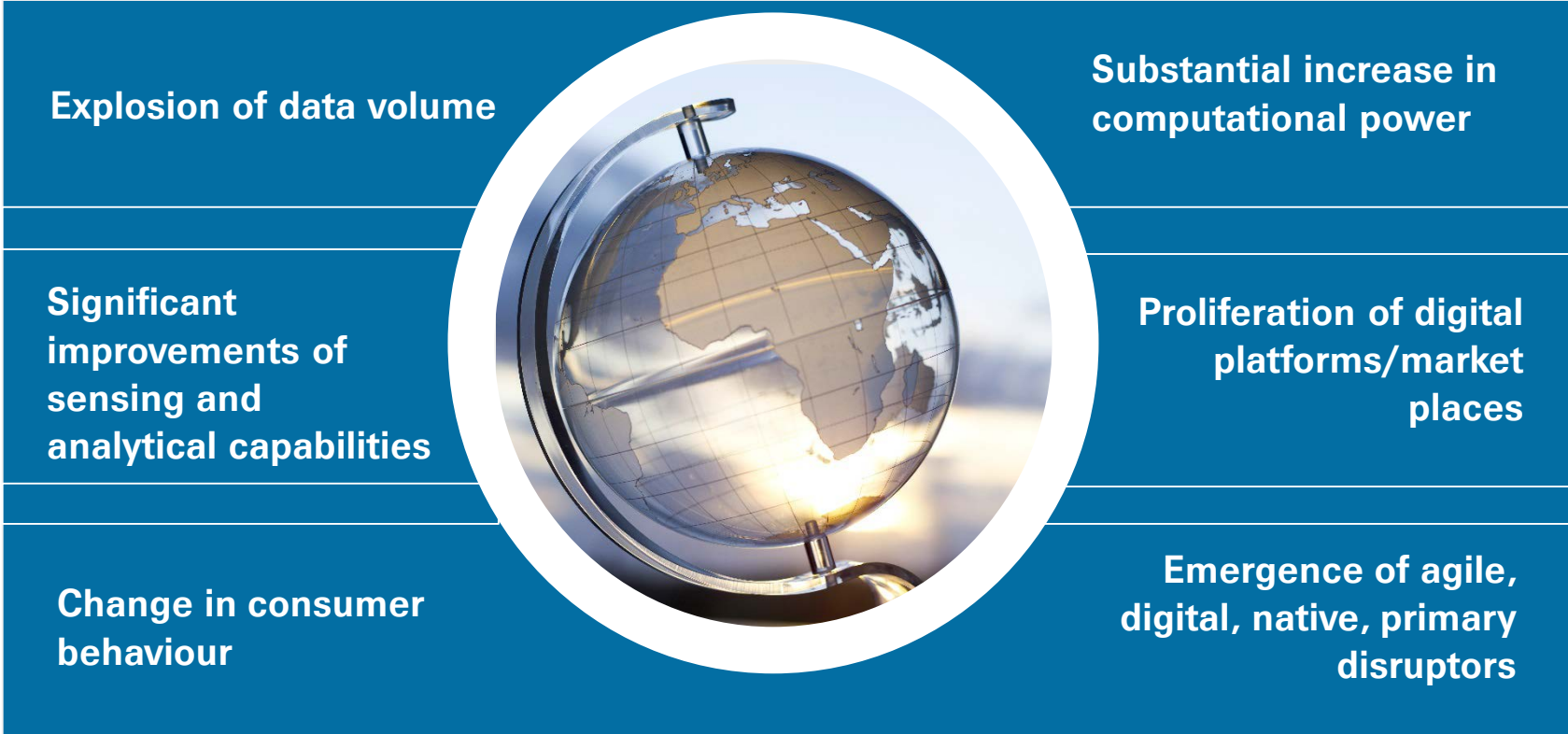
Content



- **Digital Trends**

- Examples of Analytics Use Cases
- Conclusions and Future Outlook

Swiss Re recognizes key trends which are transforming the insurance industry



Technological shift and behavioural shift

Four basic approaches (1/2)

1. Big data methods

- These are fundamental to digital transformation, using a blend of internal and external technologies and data sources.
- The more data we have, the better the (intended) end result.
- Challenge: keep finding new ways to include more good data in the analysis

2. Text analytics

- Convert text into machine-readable form & structure to extract information.
- If structured data is big, unstructured data is huge.
- Need better ways to aggregate information from multiple sources
- Uses: deliver new insights, improve efficiency and quality of business processes and to enable new types of digital services

Basic approaches and toolkits (2/2)

3. Machine learning

- Enhance historical use of statistics to assess risk and make predictions to improve predictive modeling
- Learn from data while making fewer assumptions
- This enables improved accuracy and granularity of our predictions

4. Visual analytics

- Extract business value from large complex data sets
- Interactive visual interfaces enhance human cognitive abilities that help us identify correlations and features hidden in the data
- Communicate results

Content



- Digital Trends
- **Examples of Analytics Use Cases**
- Conclusions and Future Outlook

General P&C Examples

US Hail – exposure and severity trends

- using big data analytics on 30 years of weather data plus economic data we were able to better understand these trends

Monitor cyber exposure via large volume of contract documents

- cyber wording analysis used advanced text analytics to evaluate coverage and exclusions in our portfolio

Multi-level portfolio visualization

- descriptive and visual analytics to provide insights on exposure, rate adequacy and accumulation

Optimized underwriting rules for professional liability

- identify triggers with low predictive power to optimize underwriting by reducing the number of rules that trigger manual review

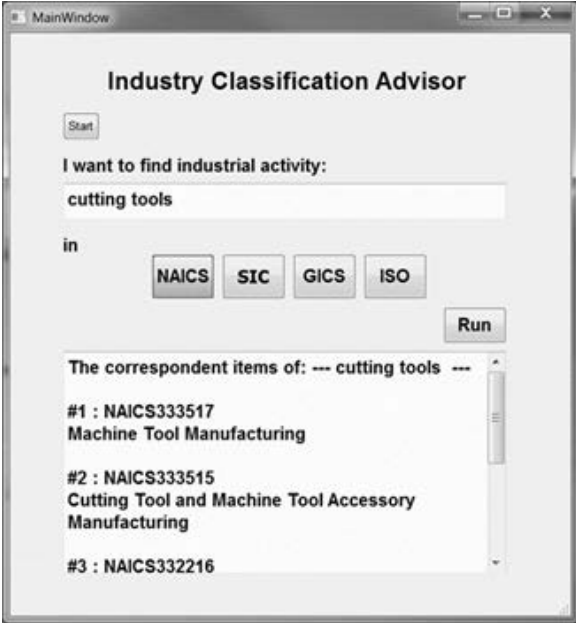
Automating claims and accounting documents

- automation for unstructured documents to improve accuracy and efficiency

Time to Make it Real

Example #1

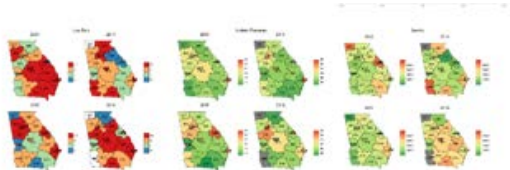
Industry Classification Advisor



Example #2

Zip Code Motor Risk Analysis

Heat Maps



A Closer Look – Example #1

The situation:

- The underwriter has a description of a risk, which needs to fit into an industry classification present in the pricing tool. This apparently simple task can lead to a significant impact on costing results.
- The costing tool has a defined number of alternatives.
- After finding out what Joinery Manufacturing actually means, you could reduce the choice to two possibilities: "Construction - Special trade contractors" and "Manufacturing – Furniture and Fixtures".
- Which one would you choose?
- What would your colleague choose?
- What if you choose different industries in different years or for different submissions?
- The impact to the expected loss can be quite large.
- And this is just a very simple example.

Industry classification

What is it?

IC organizes companies into groupings based on certain criteria



Manufacturing



Food Mfg.



Transport Equipment Mfg.



Electronics Mfg.



Motor Vehicles Mfg.



Motorcycles Mfg.



Aircraft Mfg.

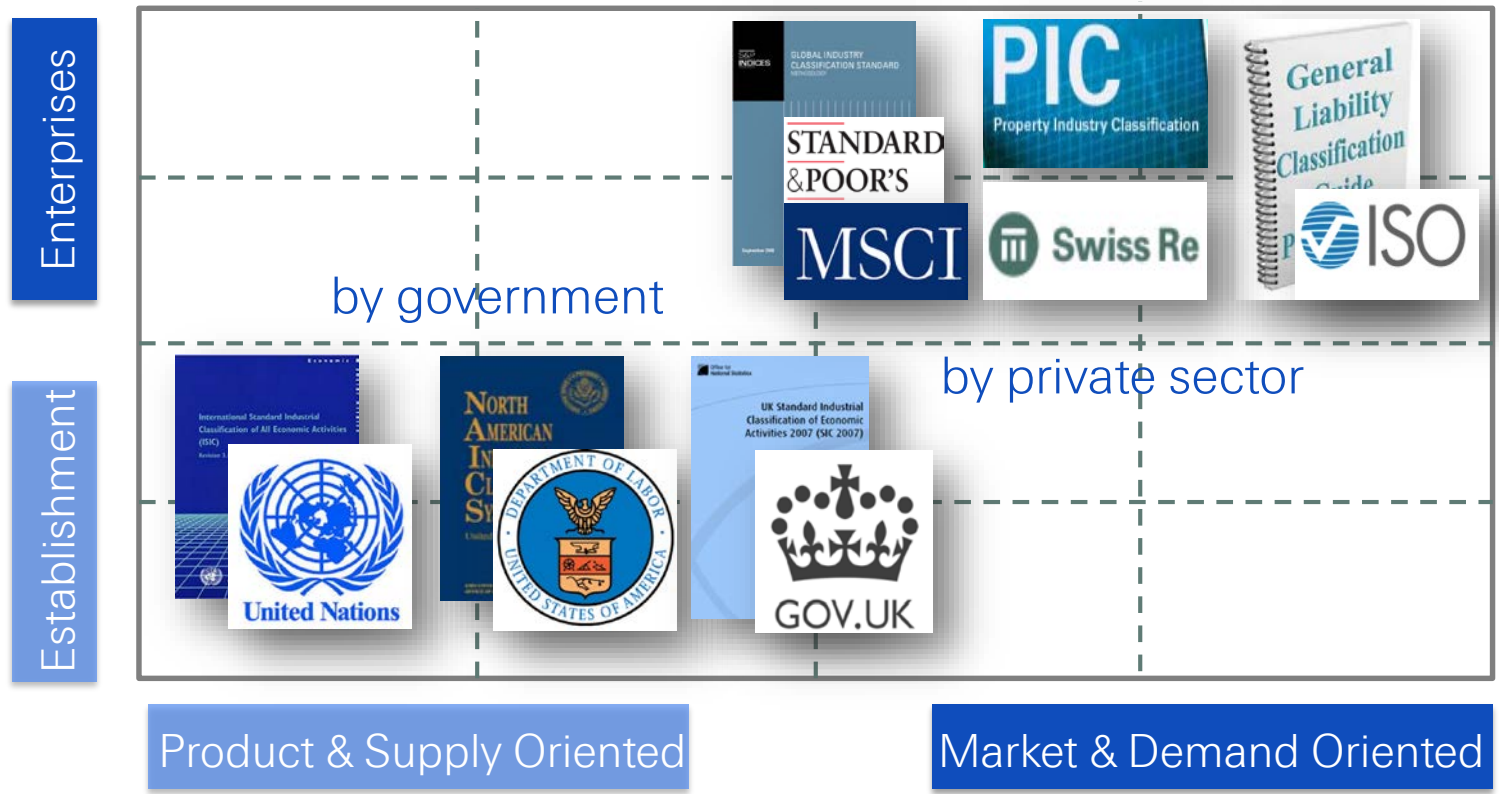
100 major groups

1000 industries

Industry Classification

Different types of industry classifications

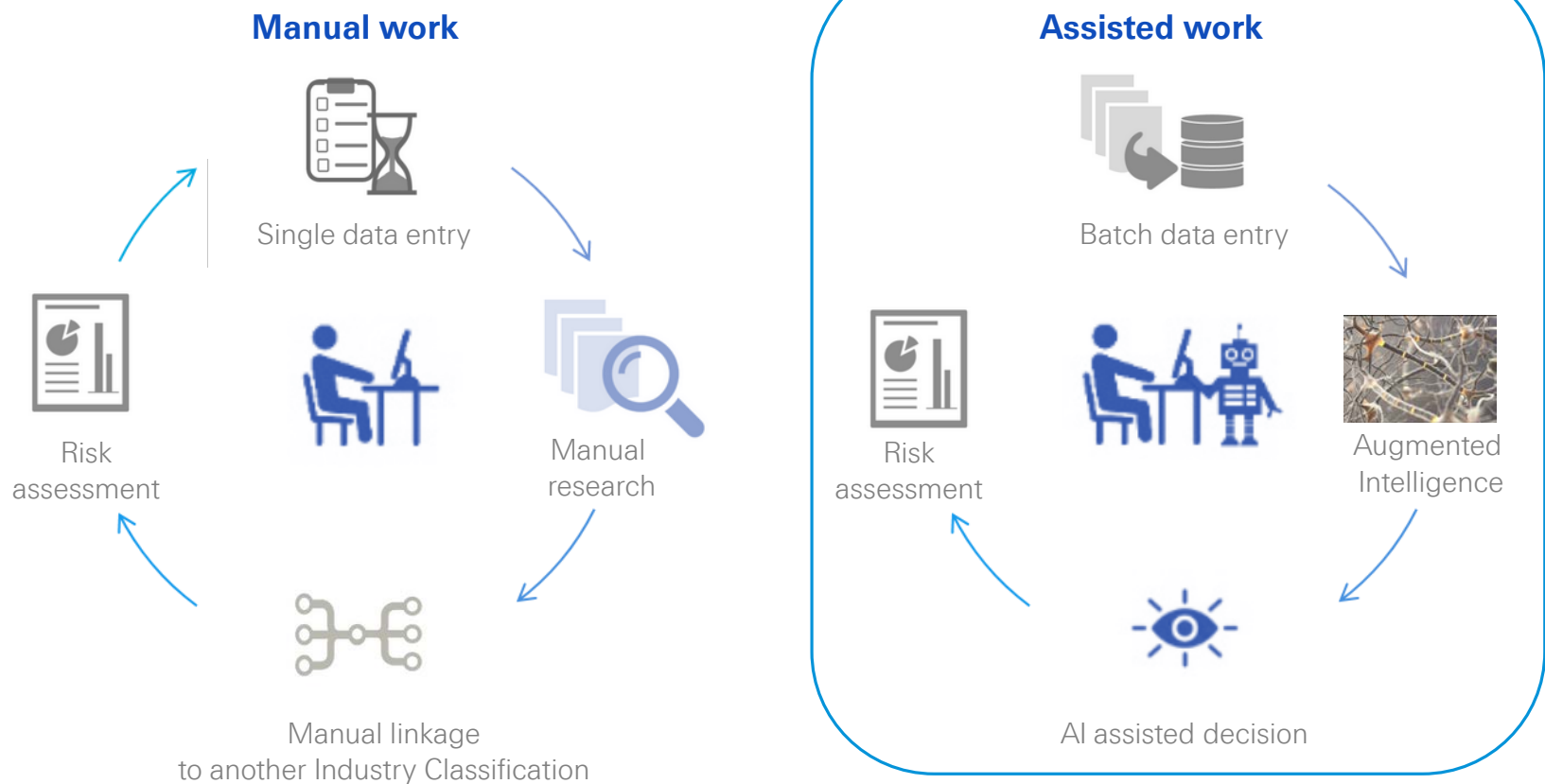
ICs developed by government and private sector have different scopes



Industry Classification

Challenge and solution

Manual work is time consuming and inconsistent



Our newly developed tool:
Industry Classification Advisor (ICA)

A Closer Look

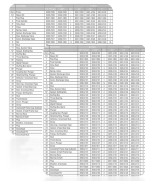
The solution:

- The tool provides an industry classification for a given description. The input can be an unstructured text such as from a website or application.
- Augmented Intelligence is a cognitive approach that allows AI to assist humans to make the most of their data and accelerate the decision-making.
- It employs two main algorithms in a novel manner:
 - Word2vec, and
 - term frequency/inverse document frequency (TF-IDF).
- Word2vec: assigns a vector in a multidimensional semantic space to a word. Vectors of words with similar syntactic and semantic information lie closer to each other. This is extremely useful for different natural language processing applications, such as search engines.
- TF-IDF: assigns a weight to each word in a given document or context which represents its relevance. The two algorithms combine to find the correct industry in a target classification by checking which "industry vector" is closer to the vector calculated for the description in the user input.

Solution and Business Cases

Evaluation by experts

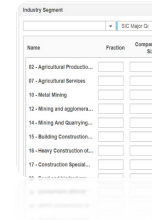
Expert quality recommendation – ICA correctly identifies relevant industry



Available data:

Annual report

Sandvik Machining Solutions is the leading supplier in the global **cutting tool** industry



Swiss Re tool:

Requires 6-digit NAICS code



Tedious report reading



333517 Machine Tool Manufacturing



Type keywords into ICA (i.e. "cutting tools")



333517 Machine Tool Manufacturing
333515 Cutting Tool and Machine Tool
Accessory Manufacturing



Solution and Business Cases

What to expect from ICA

Efficient, scalable, high quality, user friendly solution



Efficiency

- **Substantial** time saved
- Cost saving through batch process



Scalability & Scope

- Scalable to **any classification**



Quality

- **Consistent** and systematic
- Reliable, expert quality



User Experience

- **Easy** to use, interactive
- Focus on decision making

Zip Code Motor Risk Analysis – Example #2

The problem:

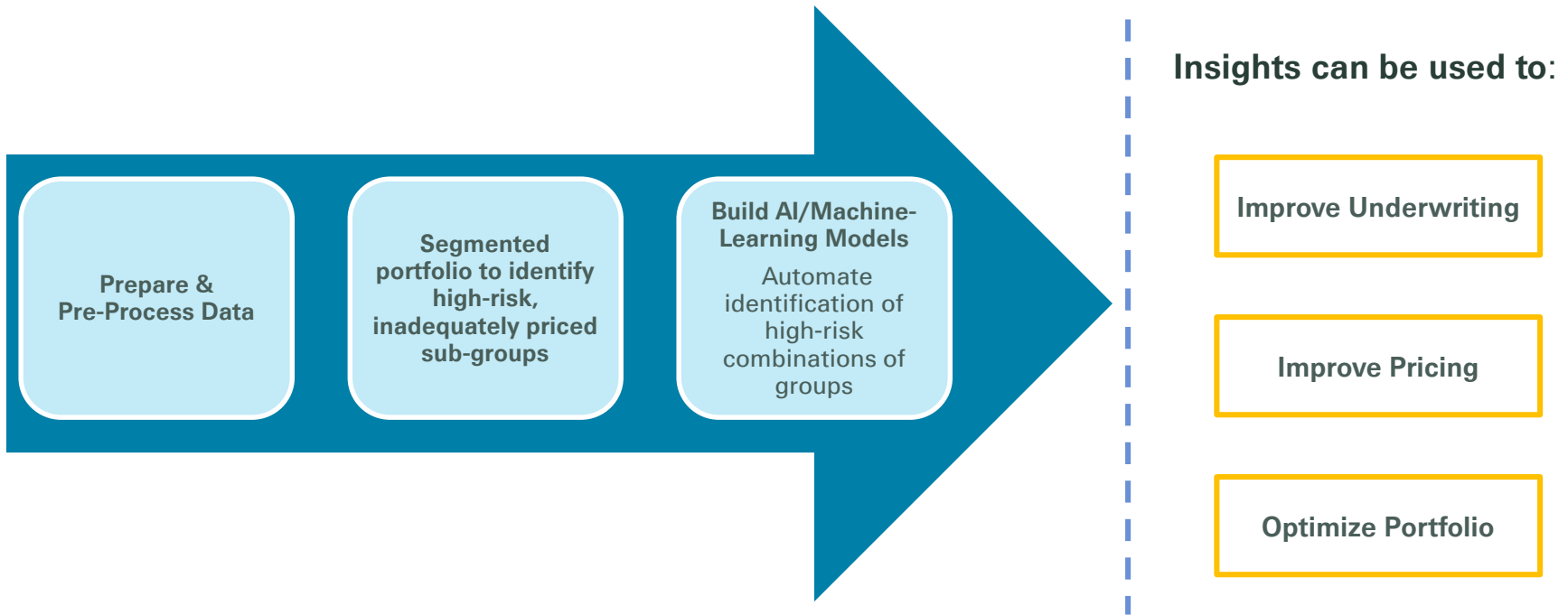
- The insured personal auto portfolio contained sub-segments that were negatively affecting overall performance
- How to specifically identify these segments and define the appropriate remedial action?
- 11 million claim and policy records

The solution:

- Analyze and visualize detailed claims and policy data by utilizing AI
- Identify target areas for portfolio improvement

High-Level Project Roadmap

Portfolio segmentation and visualization, with an overall objective of building a sophisticated AI/machine-learning model to reveal high-risk groups within the portfolio

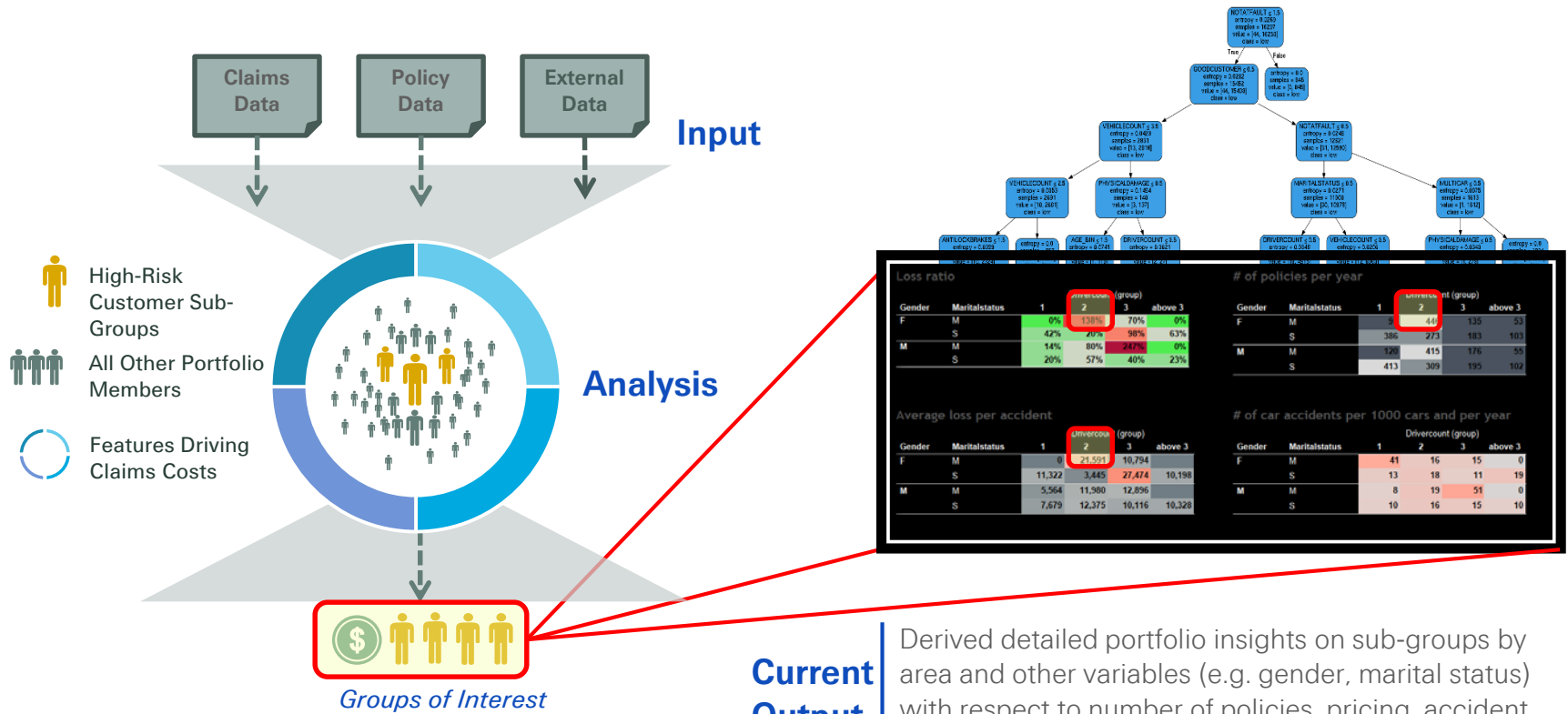


Zip Code Motor Risk Analysis – A Closer Look

- Analyzed internal claims and policy data supplemented with external data (census)
- Machine learning algorithms uncovered the key drivers for likelihoods to have car accidents given the policy information and the external data.
 - external data do matter very much!
- Identified key attributes associated with claims activity (driver age, type of vehicle, age of vehicle, etc.)
- Analyzed frequency and severity trends
- Compared expected loss ratios by 3 digit zip code to the state average (above or below)

Results

Segmented high-risk consumer sub-groups in client portfolio and created a dashboard to visualize these segments



Loss ratio					# of policies per year						
Gender	Maritalstatus	1	2	3	above 3	Gender	Maritalstatus	1	2	3	above 3
F	M	9%	133%	70%	9%	F	M	13	44	135	53
	S	42%	20%	98%	63%		S	386	273	183	103
M	M	14%	80%	247%	0%	M	M	120	415	176	55
	S	20%	57%	40%	23%		S	413	309	195	102

Average loss per accident					# of car accidents per 1000 cars and per year						
Gender	Maritalstatus	1	2	3	above 3	Gender	Maritalstatus	1	2	3	above 3
F	M	0	21,591	10,794		F	M	41	16	15	0
	S	11,322	3,445	27,474	10,198		S	13	18	11	19
M	M	5,564	11,580	12,896		M	M	8	19	51	0
	S	7,679	12,375	10,116	10,328		S	10	16	15	10

Content



- Digital Trends
- Examples of Analytics Use Cases
- **Conclusions and Future Outlook**

Conclusions

- It may just be 'automation' but it works
- Focus on solving business problems instead of the technology
- Visualization of data and results helps deliver the message
- Continuously scout for new relevant technology (acquire or build)
- Remain flexible to adapt to new technology trends
- Explore new ways of working >> pop-up teams
- Legacy systems and technical skills gaps present significant challenges to innovation but these can be overcome

Try it! Move fast! Throw it away if it doesn't add value!

Future Outlook

- Users may not need to have advanced data scientist skills but rather be able to use algorithms from existing toolkits and libraries with minimal customization
- Demand for geospatial imagery is only growing
- Big data is the oxygen we increasingly rely on. But not all data is equal.
- Smart-loss detection devices are working.
- Predictive analytics has many promising applications. It's up to us to figure them out and put them to work.

Thank you.



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What Risk?

Parametric, Indices and Residual Risks



- Reinsurance is a bespoke suit
 - What's wrong with made to measure?
 - 80% of the quality for 25% of the price
- Parametric or Index Covers
 - We have had ILW's for decades
 - No settlement issues
 - Transparency
 - Tech-deployed, sold, managed, settled and paid
- Residual (Basis) Risk can be handled via traditional reinsurance

Parametric: Examples



Flight Delay Insurance

First decentralized insurance. Payouts are automatic and almost instant. Now fully licensed.

Licensed

[Join the community](#)



Crypto Wallet Insurance

Protection against risk of theft and attacks of hackers on wallet smart contracts. Target coverage - up to \$1M.

Designed

[Join the community](#)



Collateral Protection for Crypto-backed Loans

Policy pays up to 100% of the issued loan amount if value of collateral provided by the borrower (i.e. ETH, or tokenized car) drops by 90% or more.

Designed

[Join the community](#)



Hurricane Protection

Designed for low-income individuals and small business owners. Instant payouts are triggered by wind speed registered by weather-stations within 30 mile radius from insured's permanent location.

Designed



Crop Insurance

Select your crop and the location of your field. Automated payouts are triggered by drought or flood events reported by government agencies.

Prototyped



Social Insurance

Affordable, accessible protection against risk of death or heavy illness of a community member. Immediate emergency payment which helps to get through critical times.

Prototyped

Parametric: Examples

Reinsurance News

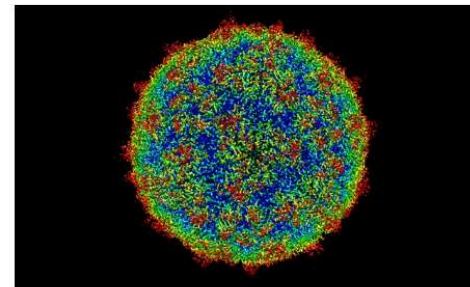
Metabiota unveils Pathogen Sentiment Index & agreement with Munich Re, Marsh

⚡ 20th April 2018 - Author: [Luke Gallin](#)

Epidemic risk modeller Metabiota has announced details of its Pathogen Sentiment Index, a tool that enables the estimation of public fear and behavioural change as a result of infectious disease outbreaks, and which is to be used to develop epidemic insurance solutions through an exclusive agreement with reinsurer Munich Re and broker Marsh.

In August last year, Metabiota announced the launch of its commercial risk modelling platform and preparedness index for epidemic risks, as well as the signing of a strategic agreement with reinsurance giant Munich Re.

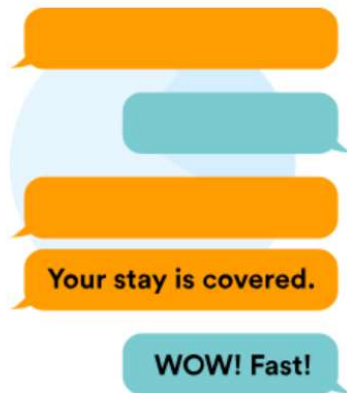
Now, the epidemic risk modeller has revealed details of its Pathogen Sentiment Index, which will be used as the basis for innovative epidemic insurance solutions to be developed and brought to the marketplace by Munich Re and insurance and reinsurance broker, Marsh, under an exclusive agreement with the pair.



On-Demand and Gig

Slice

Support



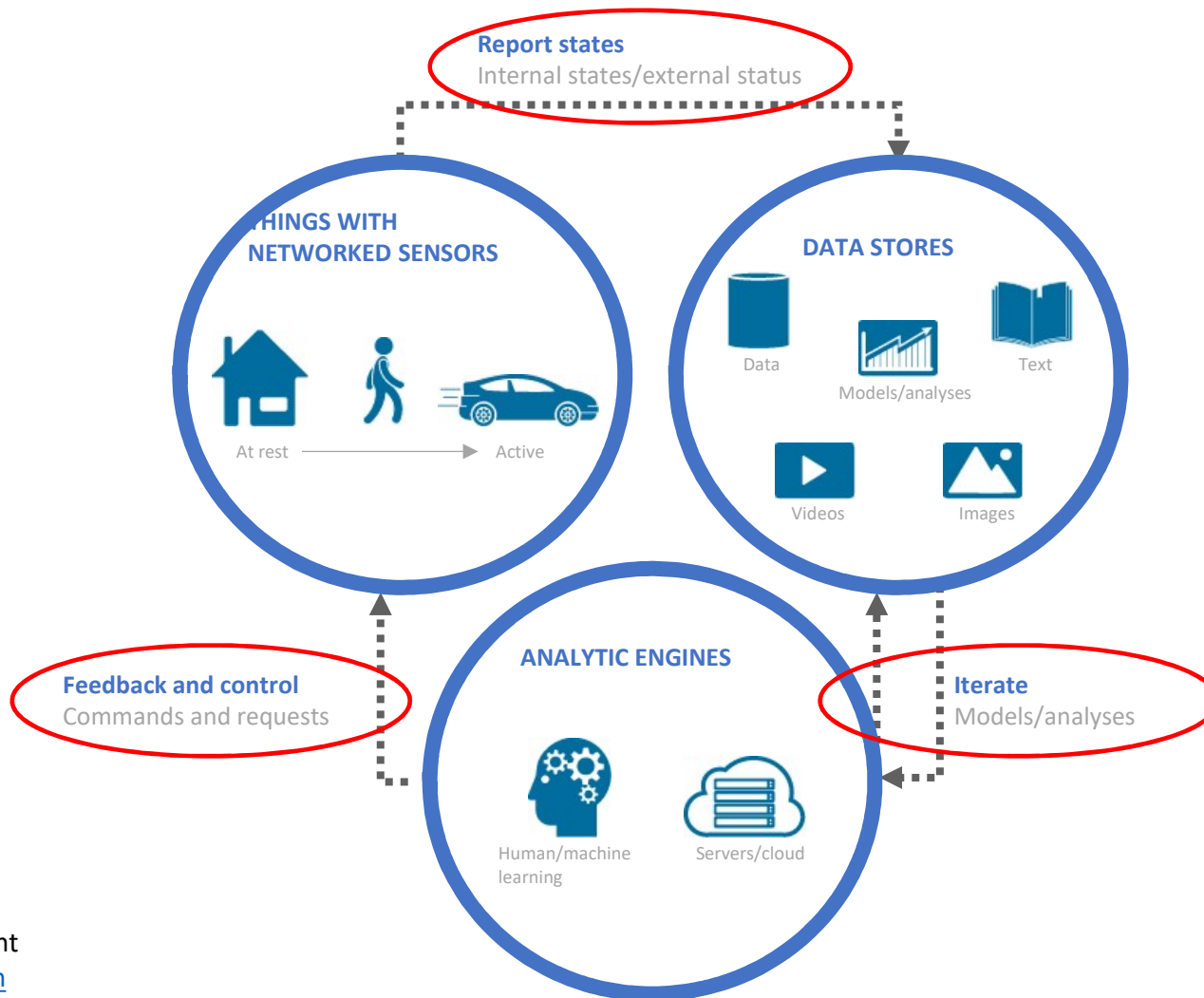
A NEW WAY

Don't buy the whole pie. Just the Slice you want.

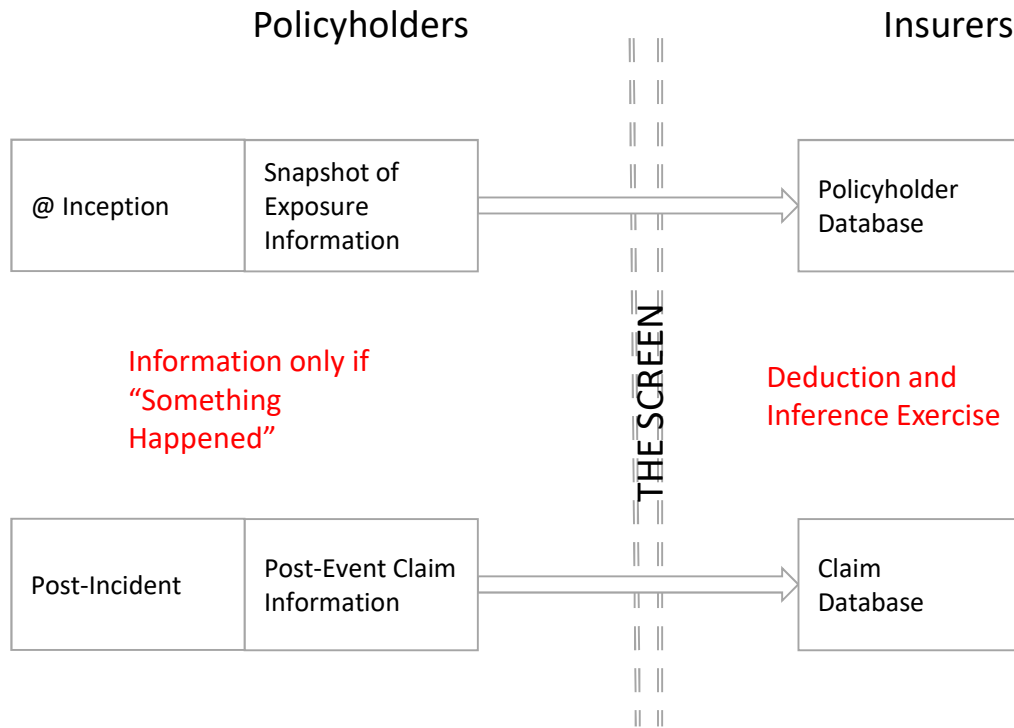
We're approaching insurance differently, changing the experience altogether.

Slice is a digital insurance company designed for you. **Instant protection, offered in affordable, bite-size chunks, when you need it.** On-demand. No hidden costs. Fast. Affordable. Fair. And made especially for you.

The Internet of Things (IoT)

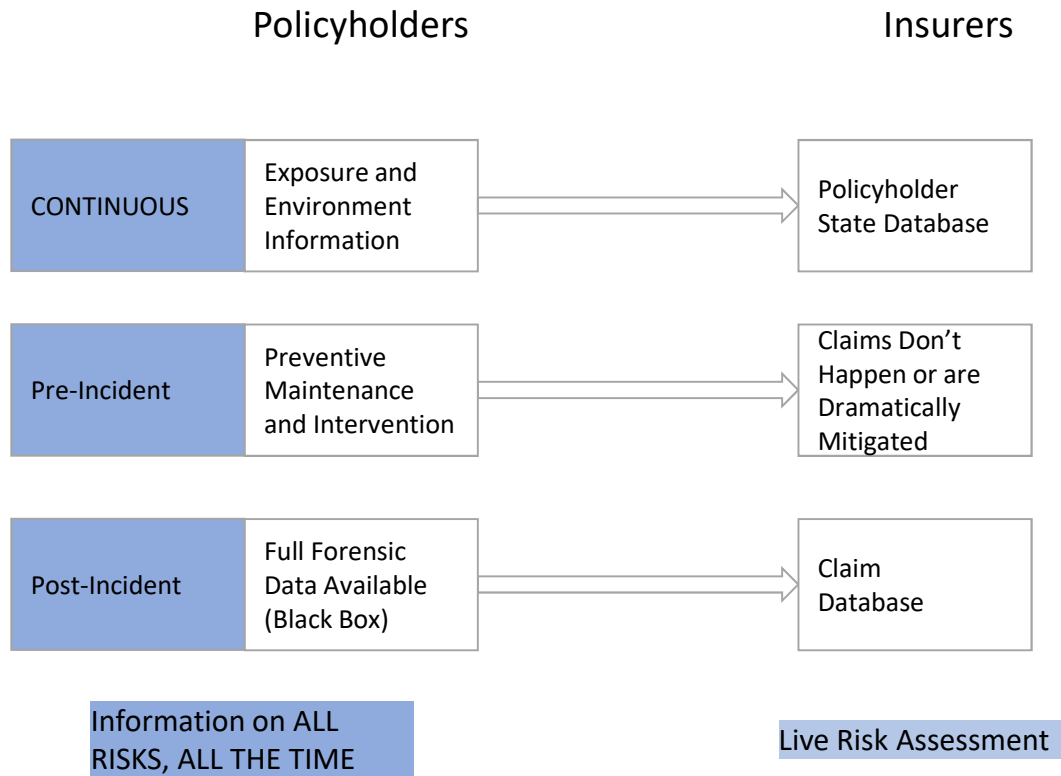


From Effects Analysis Behind the Screen...



We only receive information on claimants – what about the “near-misses”?

...to Real-Time Data Flow and Preventive Analytics AKA No More Screen



From Whom?

ACTUARY DIRECTORY SEARCH RESULT

« [Conduct a New Search](#)

Name	Title	Company	City	State
<u>Mr. Loren J. Nickel, FCAS</u>	Treasury Director, Risk	Google	Mountain View	CA

RISK MANAGEMENT

RIMS names Google's Loren Nickel as Risk Manager of the Year

Rob Lenihan

3/2/2017 1:57:00 PM

✉️ 🖨️ ↻️ REPRINTS

🔗 SHARE

Risk Management Technology

The Risk & Insurance Management Society Inc. on Thursday named Loren Nickel, director of business risk and insurance at Google Inc., as the 2017 RIMS Risk Manager of the Year.

The award will be presented to Mr. Nickel at a ceremonial breakfast and panel discussion at RIMS' 2017 conference April 25 in Philadelphia, RIMS said in a statement.

Mr. Nickel joined Google in 2015 and is responsible for business risks that affects all Alphabet Inc. companies worldwide. With \$90 billion in annual revenue, 72,000 employees and a current market cap of \$579 billion, Alphabet Inc. is the parent company of Google and several other companies, according to the statement.



Benny Mertzy/Shutterstock.com

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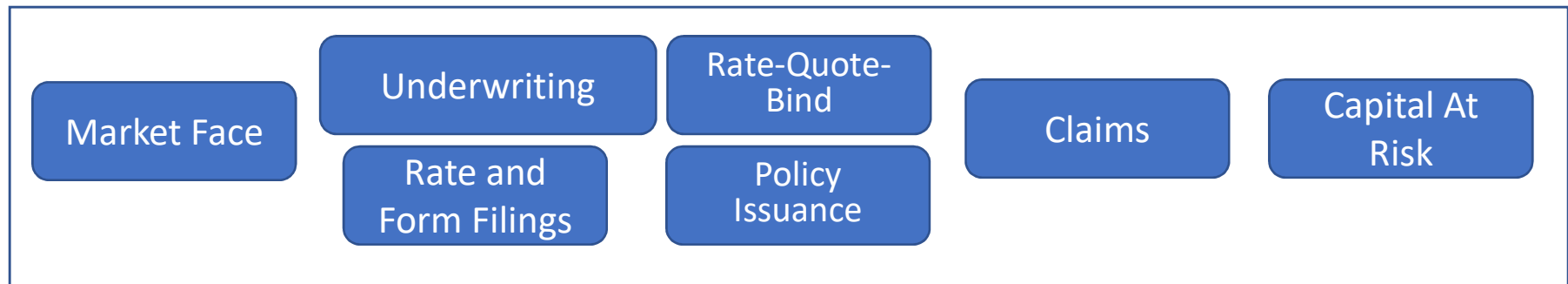
BUSINESS INSURANCE.
Captive Managers & Domiciles
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BUSINESS INSURANCE | CLM

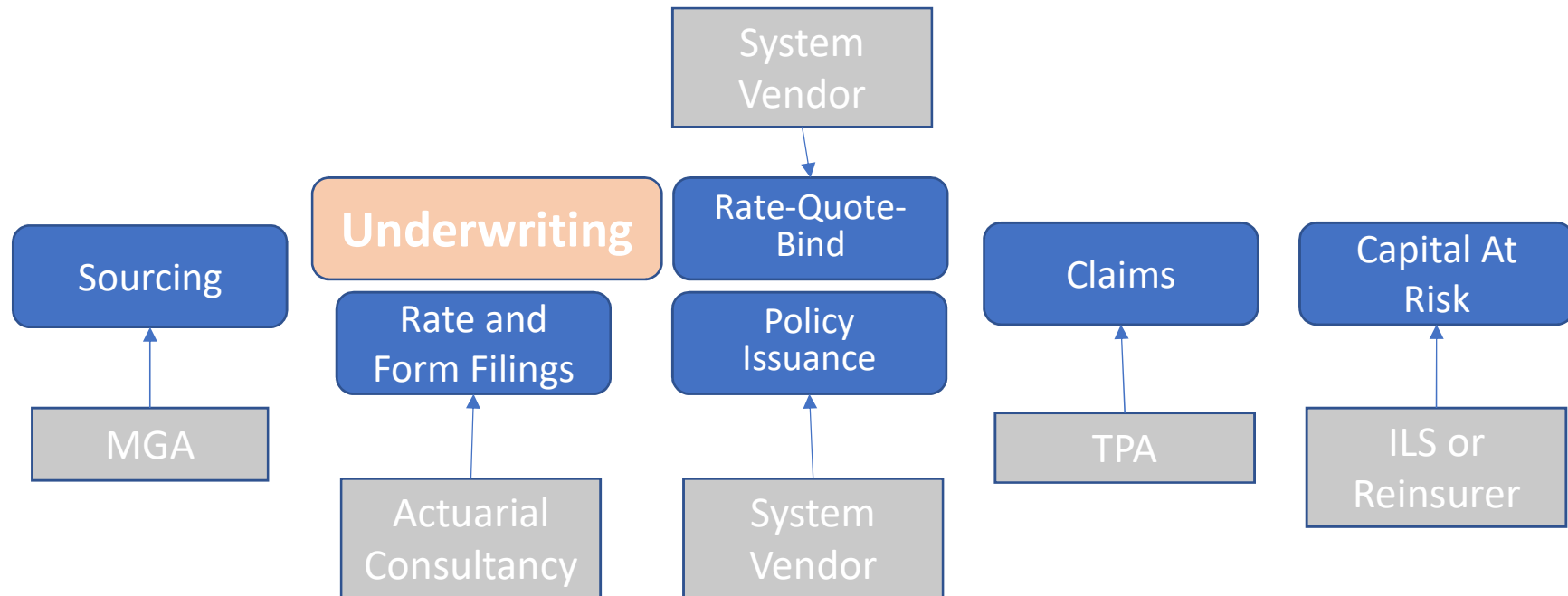
Captives

- Thank you Loren Nickel
 - Part of why he won the prize was his aggregate risk cover
- Risk Manager 2025 = CAS Member
- Retained risk experts
- Beyond loss picks and feasibility studies to TRUE ERM
- When they decide to transfer, be the flexible platform

Vertically Integrated Insurer



Modular Composite Virtual Insurer



Boost Insurance

The screenshot shows the Boost Insurance website. At the top left is the 'boost|insurance' logo. To the right is a navigation menu with links for 'OUR PLATFORM', 'FOR INSURTECHS', 'FOR (RE)INSURERS', 'ABOUT US', and 'BLOG'. A prominent orange 'CONTACT US' button is located on the far right. The main content area features a large heading 'Giving Insurance a Boost' on the left. To its right, under the heading 'INSURTECH DEVELOPMENT PLATFORM', is a paragraph describing the platform's capabilities. At the bottom of this section is an orange button labeled 'THE BOOST PLATFORM >'. The background is a dark blue gradient with a faint geometric pattern.

boost|insurance

OUR PLATFORM FOR INSURTECHS FOR (RE)INSURERS ABOUT US BLOG CONTACT US

Giving Insurance a Boost

INSURTECH DEVELOPMENT PLATFORM

The Boost Insurtech Platform™ powers insurance startups and product innovators. Our general agency structure with dedicated **paper and capacity**, a forward-thinking approach to **insurance product development**, and our API-driven **technology** systems provide all the necessary pieces for insurance ideas to become reality.

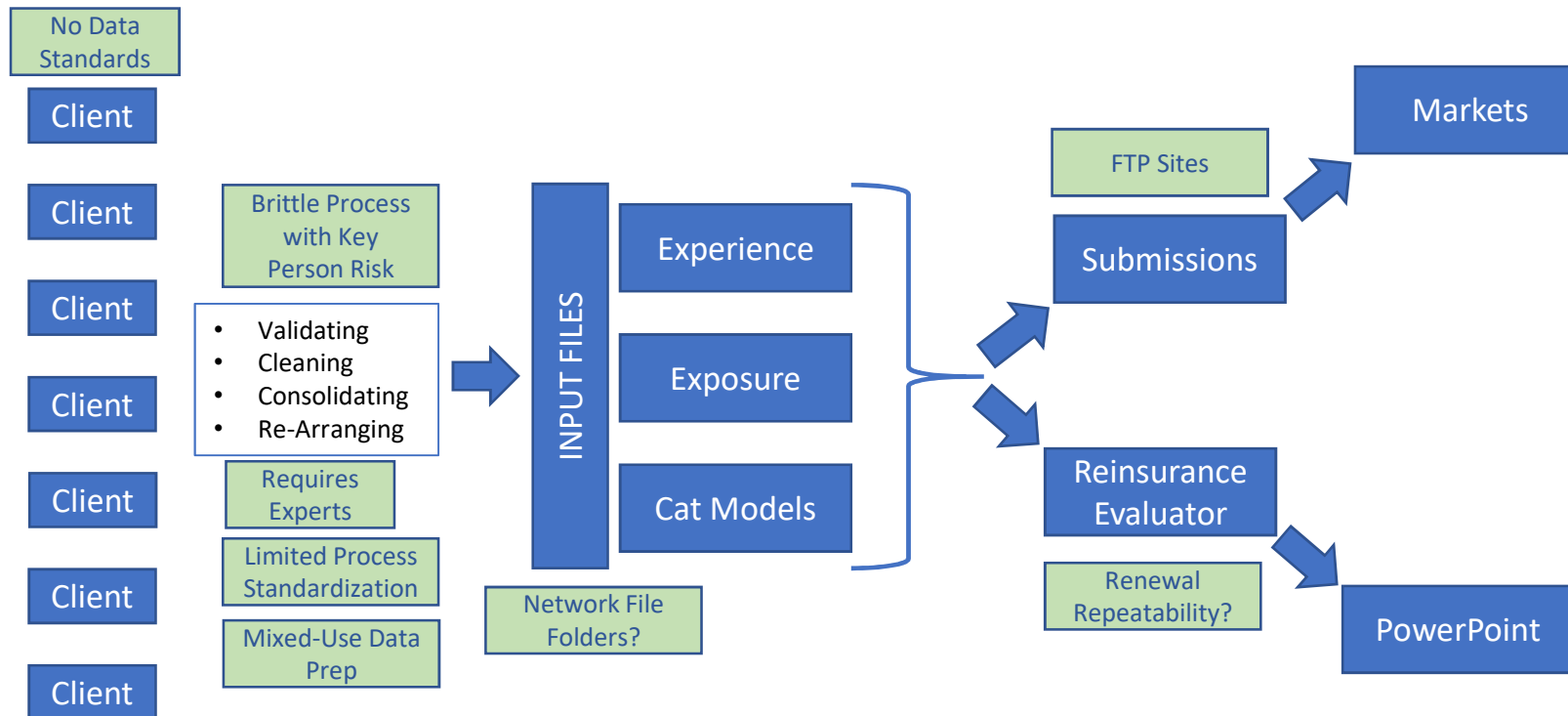
THE BOOST PLATFORM >

<https://www.boostinsurance.io/>

Innovensure Advisory Solutions

How?

Data @ Reinsurance Brokers

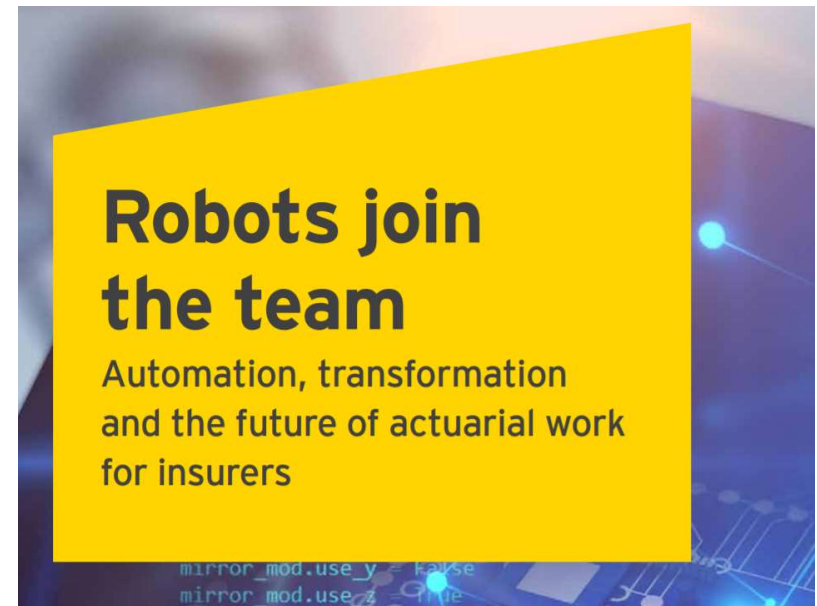


Data Prep to the Rescue

- Cloud-based global platform
- Secure
- Accessible
- Supplemented by Machine Learning
- Simplistic application of Robotic Process Automation

Robotic Process Automation EY Report

- Data preparation: extraction, reconciliation and formatting
- Reserving analysis, including rules-based selection
- Standard report preparation
- Pricing and rate monitoring
- Rate filing and rating quotes
- Experience monitoring and trend analysis
- Financial Planning and Analysis support — preparation and calculation of scenarios
- Data visualizations



[http://www.ey.com/Publication/vwLUAssets/EY-robots-join-the-team/\\$FILE/EY-robots-join-the-team.pdf](http://www.ey.com/Publication/vwLUAssets/EY-robots-join-the-team/$FILE/EY-robots-join-the-team.pdf)

Scoring

- AKA pricing via underwriting
- Ranking
- Culling
- Easy plug in for an advanced engine
- Avoids rate regulation
- E.g., cyber, trucking

Dashboards

- Human decision making under uncertainty
- Signal v Noise
- Combining qualitative and quantitative
- Human synthesizing series of complementary signals
- Skill that accretes



New Solutions for Disruptive Times

Innovensure Advisory Solutions