Data Analytics and Unstructured Data
Actuaries 2.0

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Empowering Underwriters to listen to the whole data conversation

High volume, velocity, variety

New data streams

Need for Greater transparency

Better analytical tools

The amount of data is growing 40 times as fast as the world population

Diverse and scattered data across silos contain underwriting value

Traditional data approaches are not unlocking value

Technology is no longer a barrier to exploiting data

Traditionally, insurance companies have approached underwriting insights by using internal structured data from policy, claims and reinsurance applications. This data is enhanced with external structured data feeds such as census data and 3rd party credit scores.

Richer and more varied unstructured data sources are not exploited for their valuable underwriting information because:

- Organisational data silos are difficult and expensive to integrate
- Technology to analyse large diverse data has not been available

What is an Actuary?

- Social Media
- Google Car
- Amazon Drones
- Intelligent Monitors
- Telematics
- Personal Touch?
- iRobot
- Hadoop

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Algorithms as a Service

• Data Platform enabling "War of the algorithms"
  – Platform means "Batteries Included"
  – Datasets are the currency
  – Common content accelerates competition
  – Standardised training data allows Algorithms to be directly compared

• Service consumers pick the winners
Data as a major disrupter

The disrupting forces

- Sensors enabling the streaming of data from the ambient environment
- Ubiquitous 3G/4G data connectivity
- Low cost, elastic, secure cloud compute and storage enabling the collection and connection of data
- Open Source software, innovative software solutions at lighting speed
- Data science driving Intimacy from Ambiguity
- Social data enabling enhanced customer understanding
## Data Collaboration Platform Value

Leveraging new types of data

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Geographic</strong></td>
<td>Analyse location-based data to manage operations where they occur</td>
</tr>
<tr>
<td><strong>Server Logs</strong></td>
<td>Research logs to diagnose process failures and prevent security breaches</td>
</tr>
<tr>
<td><strong>Sentiment</strong></td>
<td>Understand how customers feel about brand and products – right now</td>
</tr>
<tr>
<td><strong>Unstructured</strong></td>
<td>Understand patterns in files across millions of web pages, emails, and documents</td>
</tr>
<tr>
<td><strong>Streams</strong></td>
<td>Discover patterns in data streaming automatically from remote sensors and machines</td>
</tr>
</tbody>
</table>
Data platforms are forming

• Increasingly we are seeing the formation of data platforms

• Driven by:
  – Data streams from **Sensors**
  – Ubiquitous **Mobile** connectivity
  – Evolving **Digital** Business

• Enabled by:
  – Compelling **Visualisation**
  – Scale of **Hadoop**
  – Low cost **Cloud** provisioning
Data platforms as a marketplace

• Platforms are technology marketplaces
• Mobile operating systems are a good example:
  – Gave rise to the **app marketplace**
  – $100 billion app economy in less than 7 years\(^1\)
• Data platforms as a business model:
  – Enable **Marketplaces for data exploitation services**
  – Have a buy-side and a sell-side
  – Has channels
  – Generates new and enhances existing revenue streams

Data Innovation Lifecycle

1. What are the big questions that need to be asked to fuel business growth?
2. What data do you already have internally that could be exploited?
3. Which PoC’s are worth investing in? What are the analytics opportunities?
4. Call to action, build out a proof of concept, understand the challenges and benefits
5. Is the outcome from PoC worth investing in, does the business case stack up?
6. Industrialise the solution, build out the solution so that it can start to drive value.
7. Do you know when to kill off an analytics project or change tactics, monitor and govern.
Why directed data science? There is a need to guide the discovery and exploration, direction is given as to where to apply the data and algorithms based on a set of assumptions and hypothesis that are to be observed within the data.
What’s a data scientist?

- The shopping list
  - A computer programmer
  - A statistician
  - A data visualisation expert
  - A machine learning expert
  - A data engineer
  - A subject matter expert
  - A database administrator
  - A Hadoop engineer
  - An actuary

- The reality?
  - You need to take a team approach
  - Each discipline is going to have to evolve

Actuary 1.0 ➔ Actuary 2.0
## Hypothesis Generation – old world

### Points for consideration

<table>
<thead>
<tr>
<th>Additional pieces of information</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Location of claim</td>
</tr>
<tr>
<td>• Claims by Head of Damage</td>
</tr>
<tr>
<td>• Identify worst case for individual losses</td>
</tr>
<tr>
<td>• Point of underwriting</td>
</tr>
<tr>
<td>• Customer segmentation</td>
</tr>
<tr>
<td>• Risk appetite</td>
</tr>
<tr>
<td>• External market data</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Potential Hypotheses to investigate</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Do certain customer segments have higher claim frequencies?</td>
</tr>
<tr>
<td>• Are older outstanding claims redundant?</td>
</tr>
<tr>
<td>• Outstanding claims remaining on settled claims?</td>
</tr>
<tr>
<td>• Are there any negative outstanding and paid claims?</td>
</tr>
<tr>
<td>• Do duplicate claims exist on the system?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Use of data in the pricing process</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Determine credibility weights in pricing depending on size of claims and claim experience on other exposures (e.g. liability)</td>
</tr>
<tr>
<td>• Separate identification of IBNR / IBNER by claim in pricing model to understand uncertainty</td>
</tr>
<tr>
<td>• Use market inflation rates to create as-if scenarios</td>
</tr>
<tr>
<td>• Tenure of policyholder</td>
</tr>
</tbody>
</table>

With new data there are more possibilities and opportunities.
Hypothesis Generation – new world
How does new forms of information change the characteristics of the risk?

- For motor insurance, details of 3 individuals who look similar on paper are given below.
- After each line of data update the risk ratings using the scale below:

<table>
<thead>
<tr>
<th>Policy application data</th>
<th>Risk Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data</td>
<td>Neville</td>
</tr>
<tr>
<td>Age</td>
<td>Mid 30s</td>
</tr>
<tr>
<td>Driving Experience</td>
<td>14 years</td>
</tr>
<tr>
<td>Car</td>
<td>BMW 5 Series</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Neville</th>
<th>John</th>
<th>Chris</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>
Hypothesis Generation
How does new forms of information change the characteristics of the risk?

<table>
<thead>
<tr>
<th>Data from social media</th>
<th>Risk Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Neville</strong></td>
<td><strong>John</strong></td>
</tr>
<tr>
<td>Wine producer – attends many wine tasting events</td>
<td>Sports fan – travels frequently for sports events</td>
</tr>
<tr>
<td>Drinks heavily</td>
<td>Regularly goes to the gym</td>
</tr>
<tr>
<td>Spends a lot of time driving hire cars</td>
<td>Car enthusiast – knows cars and how they work</td>
</tr>
<tr>
<td>Seems to cover many miles via car</td>
<td>Drives to work – regularly drives on congested roads</td>
</tr>
<tr>
<td>Reasonably wealthy – middle class socio-economic position</td>
<td>Works in HR</td>
</tr>
</tbody>
</table>
Hypothesis Generation
How does new forms of information change the characteristics of the risk?

- Graphs below show the results of this exercise ran with 10 KPMG analysts.
- Results impacted by individual’s perception of risk, leading to a range of values.
Social media
Data analytics for targeted marketing

Used Social Channels to

• Collect customer information
• Sharing platform to up sell insurance products
• Engagement platform to target potential customers

Campaign
Digital Campaign Planning included:
• Product Offering
• Targeted Segment
• Digital Community Sourcing
• Campaign Design

Promotions
Push promotions (low cost travel Insurance) through their Social Media

Sharing
share links, offers with their friends, as well as share to other content.

Products
Other Insurance Product offerings can be found on Social Media

Outcomes
80,000 leads within 3 weeks, 58,000 users signed as friends/followers

500 – 1,000 followers are added daily

300% Improvement in Sales using Social Channels

Most important customer to target is the one with the most influence
Intelligent Monitors – Home Telematics
Home sensor network for peril detection and aggregation

- Fire alarms detection
- Monitor heat and CO levels in the home
- Gas and electricity consumption monitoring
- Intruder detection
- Water usage and leak detection
- Home hub sensor aggregator
- Customer Alerting and Monitoring
- Insurance Company monitors alerts and takes action
Telematics
Usage based Underwriting

Outcomes
- Ability to stream GPS and Behavioural data in real time of all insured risks
- External data such as traffic information adds greater insight
- Cross sell of value add services such as First Response, Road Assist

New business opportunities using GPS and behavioural data to improve risk assessment
Conclusions

• The data universe is expanding
• There is a revolution in algorithms and analysis
• There is a huge opportunity for actuaries to lead the charge in this new world, working with other disciplines
• Those not leading the charge will be left behind
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