



Institute
and Faculty
of Actuaries



Data Analytics and Unstructured Data

Actuaries 2.0

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ertise
ponsorship
Thought leadership
Progress
Community
Sessional meetings
Education
Working parties
Volunteering
Research
Shaping the future
Networking
Professional support
Enterprise and risk
Learned society
Opportunity
International profile
Journals
Support



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^{1,2}

Diverse and scattered
data across silos
contain underwriting
VALUE

Traditional data
approaches are not
UNLOCKING value

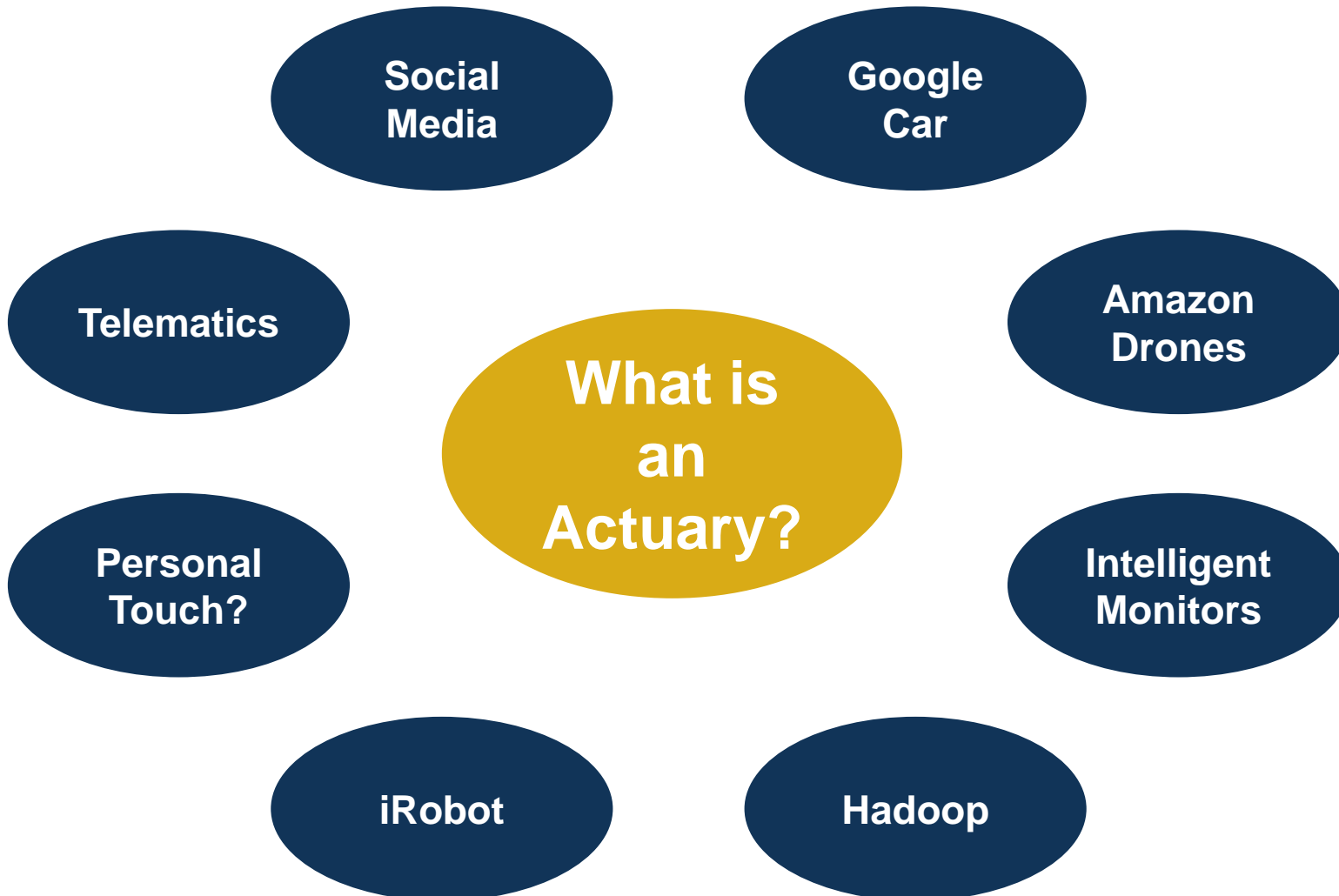
Technology is no
longer a barrier to
EXPLOITING data

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

1. http://www.csc.com/insights/flxwd/78931-big_data_universe_beginning_to_explode
2. <http://www.worldpopulationstatistics.com/population-rankings/world-population-by-year/>



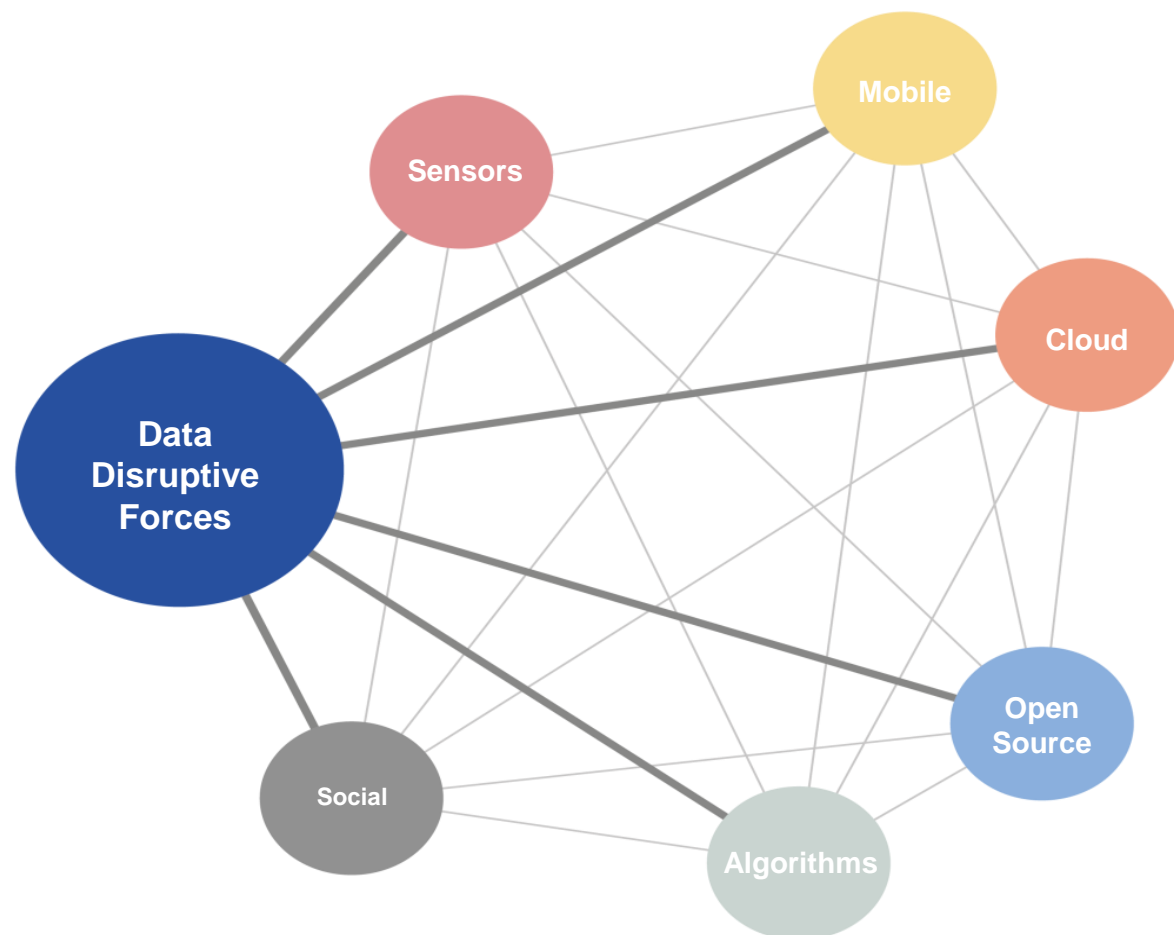


Algorithms as a Service



- 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



Geographic

- Analyse location-based data to manage operations where they occur



Server Logs

- Research logs to diagnose process failures and prevent security breaches



Sentiment

- Understand how customers feel about brand and products – right now



Unstructured

- Understand patterns in files across millions of web pages, emails, and documents



Streams

- Discover patterns in data streaming automatically from remote sensors and machines



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



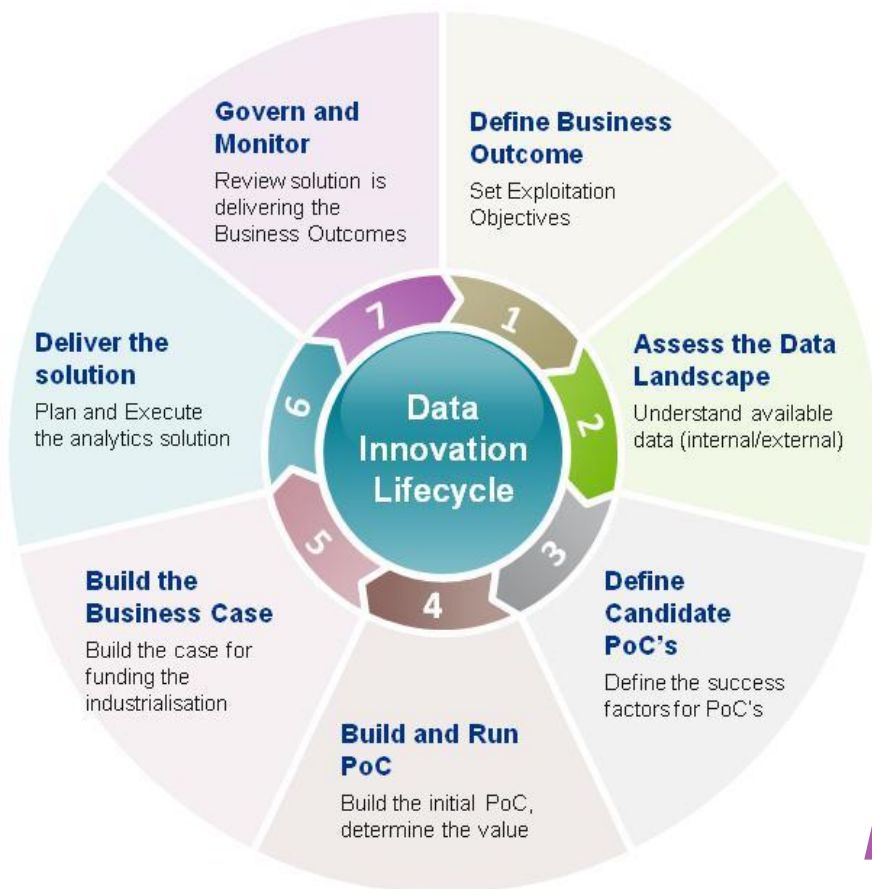
Data platforms as a marketplace



- 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 years¹
- 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

1. <http://appnationconference.com/main/research/>

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.

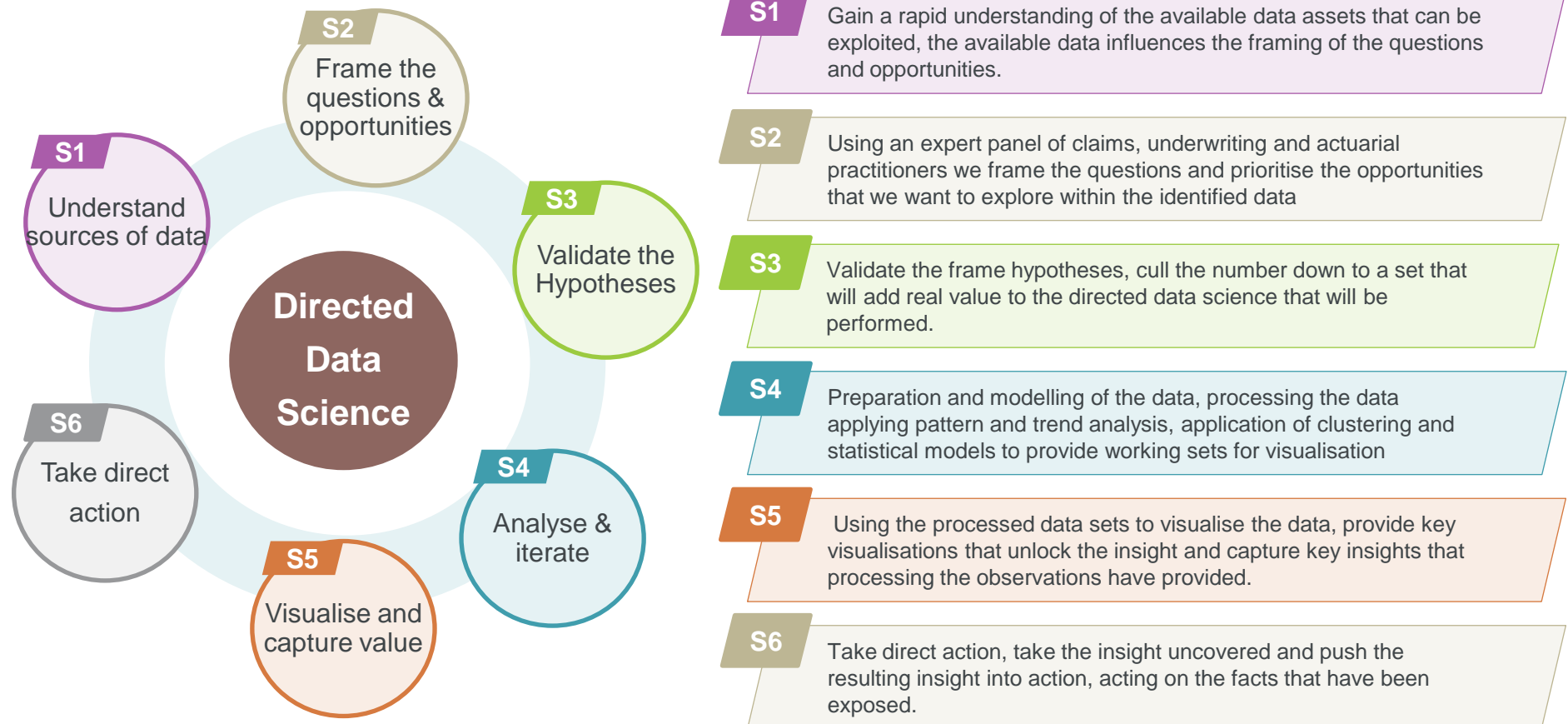


7

Do you know when to kill off a analytics project or change tactics, monitor and govern.



Directed Data Science Framework



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

Additional pieces of information

- Location of claim
- Claims by Head of Damage
- Identify worst case for individual losses
- Point of underwriting
- Customer segmentation
- Risk appetite
- External market data

Potential Hypotheses to investigate

- Do certain customer segments have higher claim frequencies?
- Are older outstanding claims redundant?
- Outstanding claims remaining on settled claims?
- Are there any negative outstanding and paid claims?
- Do duplicate claims exist on the system?

Use of data in the pricing process

- Determine credibility weights in pricing depending on size of claims and claim experience on other exposures (e.g. liability)
- Separate identification of IBNR / IBNER by claim in pricing model to understand uncertainty
- Use market inflation rates to create as-if scenarios
- Tenure of policyholder

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:



Policy application data					Risk Ratings		
Data	Neville	John	Chris		Neville	John	Chris
Age	Mid 30s	Mid 30s	Mid 30s	➤	50	50	50
Driving Experience	14 years	15 years	11 years	➤			
Car	BMW 5 Series	VW Golf	Vauxhall Insignia	➤			



Hypothesis Generation

How does new forms of information change the characteristics of the risk?

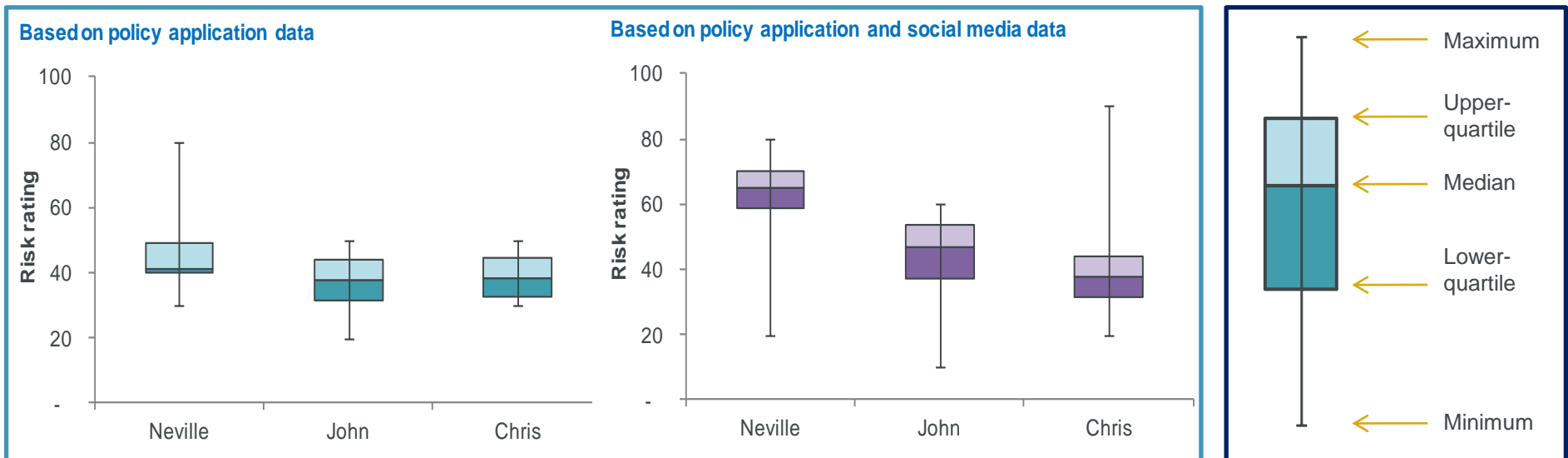
Data from social media				Risk Ratings		
Neville	John	Chris		Neville	John	Chris
Wine producer – attends many wine tasting events	Sports fan – travels frequently for sports events	Technology enthusiast	➤			
Drinks heavily	Regularly goes to the gym	Poor quality diet	➤			
Spends a lot of time driving hire cars	Car enthusiast – knows cars and how they work	Not car savvy – couldn't turn off an automatic wiper in a car wash	➤			
Seems to cover many miles via car	Drives to work – regularly drives on congested roads	Spends a lot of money on fuel – often travels very early in the morning	➤			
Reasonably wealthy – middle class socio-economic position	Works in HR	Understands telematics and how they are used – seems financially astute	➤			



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

Outcomes

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

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*

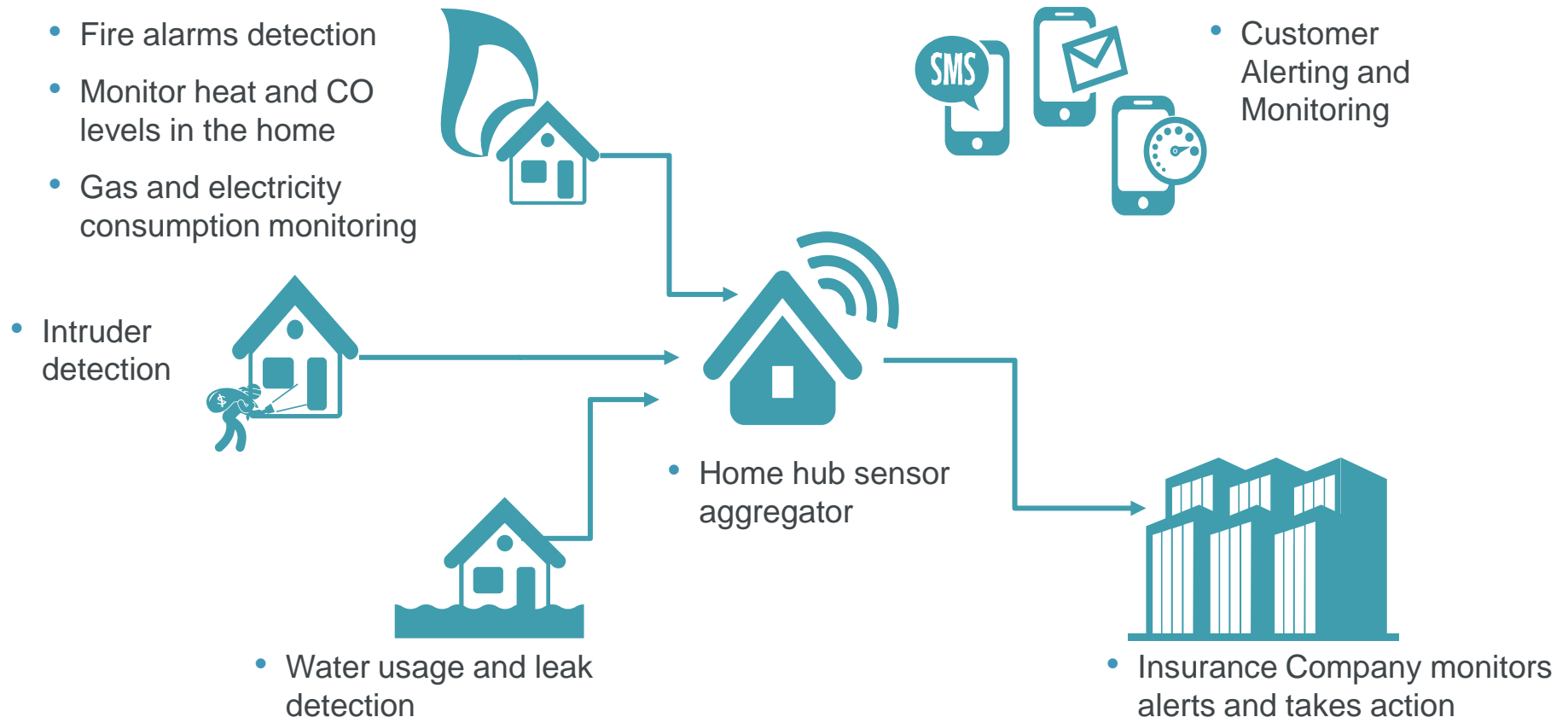
500 – 1,000
followers are
added daily

**Most important customer to target is
the one with the most influence**

300%
Improvement in
Sales using
Social Channels

Intelligent Monitors – Home Telematics

Home sensor network for peril detection and aggregation





Telematics

Usage based Underwriting



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

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



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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