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ABXΔ

Big Data: Unexplored blue ocean in the life industry

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Nicole Pang

13 March 2017

Agenda

Background – what is big data and why is it relevant to life insurers	**Issues in the life insurance industry**	**How big data can solve these issues**	**Getting started with big data and Analytics**
		1. Cost and speed 2. Agility 3. Connecting and sharing information 4. Personalisation 5. New business models	
1	**2**	**3**	**4**

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Ignoring big data isn't an option
Its use will become fundamental to the operating model

> **Today, if you're not disrupting yourself, someone else is; your fate is to be either the disrupter or the disrupted. There is no middle ground.**
>
> **Salim Ismail, Exponential Organisations:**
> Why new organisations are ten times better, faster, and cheaper than yours

> **There were 5 exabytes of information produced between the dawn of civilisation through 2003, but that much information is now created every 2 days**
>
> **Eric Schmidt,**
> then Google CEO

Life insurers are starting to invest in Big Data Analytics…

European insurers such as AXA, Aviva and Allianz, along with MassMutual and American Family in the US and Ping An in Asia have all set up specialist venture capital funds dedicated to investing in start-ups that may be relevant for their core businesses.

Other insurers, such as MetLife and Generali, have taken a different route and invest in conjunction with existing venture capital firms.

Source: Financial Times

Where Life Insurers can use Big Data Analytics…

Better understanding of policyholder risk

Improved retention (can apply to policyholders and staff)

Focused marketing strategy

More driven salesforce

Large claim identification

Robo advice

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3

A quick recap on what we mean by Big Data

"You can have data without information, but you cannot have information without data"

Daniel Keys Moran

"Information is the oil of the 21st century, and analytics is the combustion engine"

Peter Sondergaard, Gartner Research

"Big Data is an enormous increase in opportunities to generate data, sharing data, combining data and analysing data, leading to new insights and a new way of reasoning"

Dutch National Think Tank 2014

x10 the amount of digital information will increase tenfold every five years

90% of the world's current data was created in the last two years

60 sec. sees 98,000 tweets, 695,000 status updates, 11 million instant messages

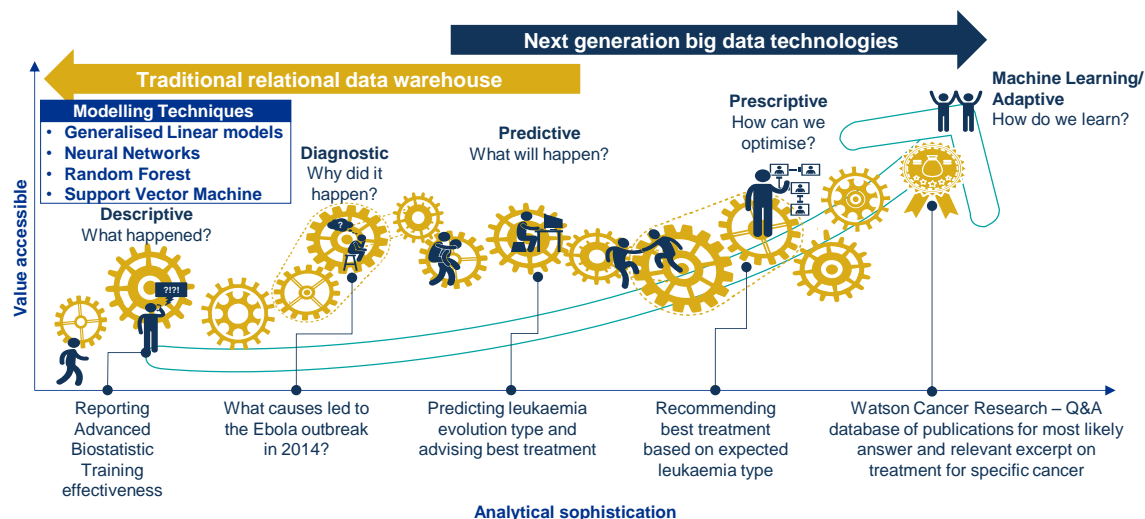30 Billion pieces of content shared on Facebook each month

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Whilst Big Data grabs the headlines…
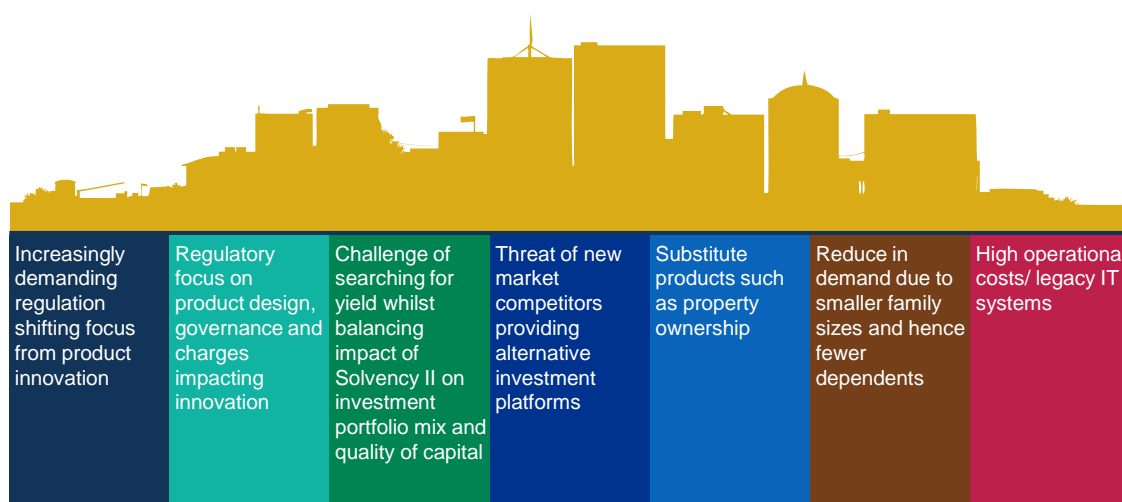# …the game-changer is maturing the analytics

Next generation big data technologies

Traditional relational data warehouse

Value accessible

Modelling Techniques
• **Generalised Linear models**
• **Neural Networks**
• **Random Forest**
• **Support Vector Machine**

Descriptive
What happened?

Diagnostic
Why did it happen?

Predictive
What will happen?

Prescriptive
How can we optimise?

Machine Learning/ Adaptive
How do we learn?

Reporting Advanced Biostatistic Training effectiveness

What causes led to the Ebola outbreak in 2014?

Predicting leukaemia evolution type and advising best treatment

Recommending best treatment based on expected leukaemia type

Watson Cancer Research – Q&A database of publications for most likely answer and relevant excerpt on treatment for specific cancer

Analytical sophistication

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5

The insurance marketplace is…
…hugely competitive and facing significant challenges

| Increasingly demanding regulation shifting focus from product innovation | Regulatory focus on product design, governance and charges impacting innovation | Challenge of searching for yield whilst balancing impact of Solvency II on investment portfolio mix and quality of capital | Threat of new market competitors providing alternative investment platforms | Substitute products such as property ownership | Reduce in demand due to smaller family sizes and hence fewer dependents | High operational costs/ legacy IT systems |

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6

3

The life insurance industry is declining…

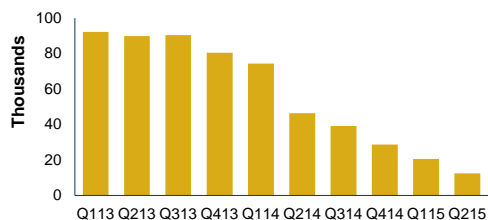# The decrease is most apparent in annuity businesses

A fifth of people who used to have a life insurance policy have subsequently lost or given up the cover

Source: YouGov

In the first three months since pension reforms were introduced in April 2015, **£2.5bn** was withdrawn from pension pots
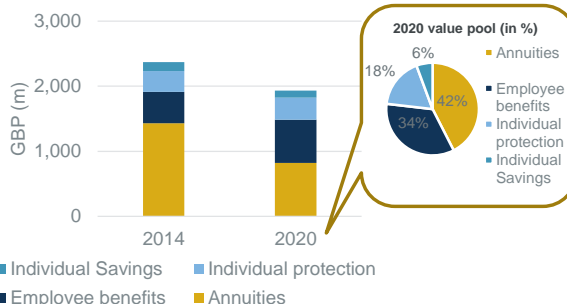
Source: ABI

New Business Profit Value

2020 value pool (in %)

- Annuities
- Employee benefits
- Individual protection
- Individual Savings

6%
18%
42%
34%

- Individual Savings
- Individual protection
- Employee benefits
- Annuities

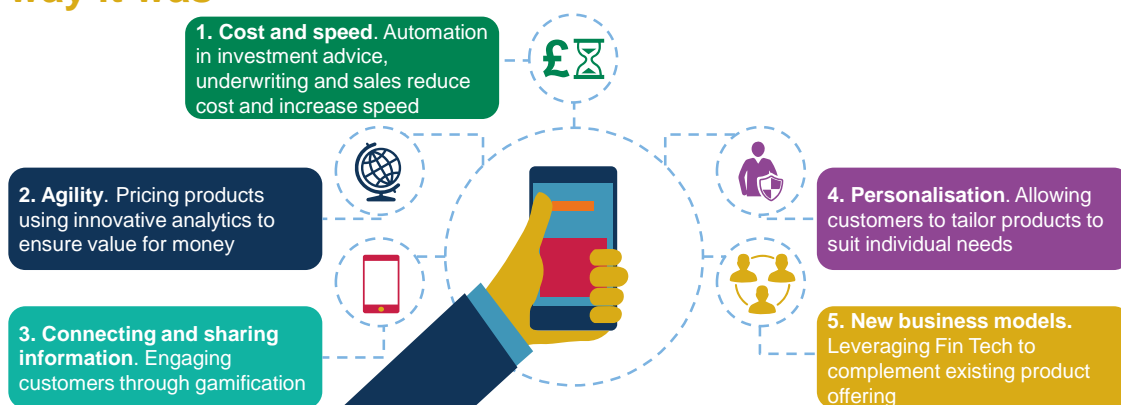*Source: ABI data, KPMG benchmarking and analysis*

Note:
- Annuities includes pension annuities, bulk annuities and income drawdown
- Employee benefits include pensions and group protection
- Individual protection includes term life, whole of life and other life insurance
- Individual savings include endowment, investments, offshore business and pensions

Sale of Pension Annuities

Thousands (Q113, Q213, Q313, Q413, Q114, Q214, Q314, Q414, Q115, Q215)

Source: FCA

Why is life insurance declining…

People no longer see it as an essential product in the way it was

1. Cost and speed. Automation in investment advice, underwriting and sales reduce cost and increase speed

2. Agility. Pricing products using innovative analytics to ensure value for money

3. Connecting and sharing information. Engaging customers through gamification

4. Personalisation. Allowing customers to tailor products to suit individual needs

5. New business models. Leveraging Fin Tech to complement existing product offering

How can big data solve this?

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1. Cost and speed (investment advice)

Providing cheaper and instant financial advice through Robo-advisors

2020 value pool
- Annuities
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- Individual Savings

6% · 18% · 34% · 42%

The role of Robo-advisors
— Portfolio management advice with minimal human intervention
— Employ algorithms such as Modern portfolio theory
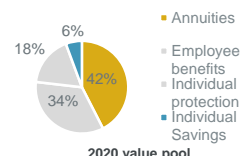— Algorithmically-based automated investment solutions

Relevance for Life Insurers:
— Enables access to the market segment unaccustomed/unwilling to pay for advice
— Face new competitors such as investment platforms
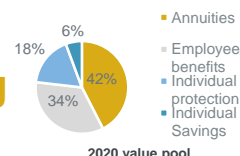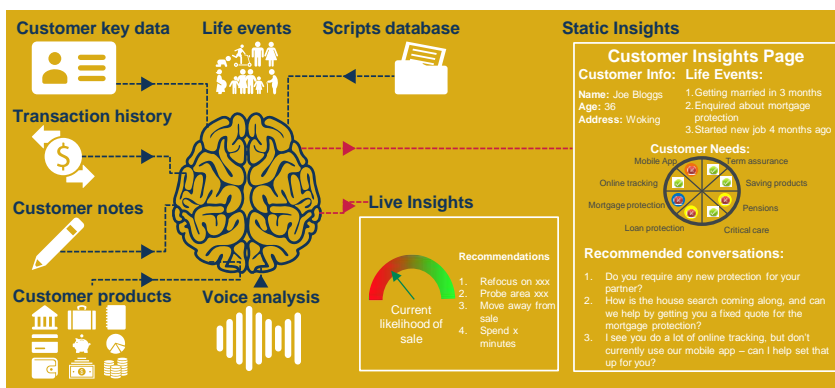— Proportionately low overheads with controlled regulatory risks

Just Retirement – first simple pension advice service provider
—Help retirees with medium-sized pension funds navigate new at-retirement freedoms.
—Transactional charges and clients not acting on recommendations will not have to pay.
—Regulated advice with personalised recommendations.
—Overcome the main barrier to advice, which is that consumers believe it is too expensive.

LV=
—Bought a majority stake in robo-advice developer Wealth Wizards.
—Launched an automated retirement advice service called Retirement Wizard.

In June 2016, the FCA has set up the Advice Unit to help firms develop models that use technology to deliver lower cost advice.

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1. Cost and speed (sales)

Generating real-time tailored guidance using voice analytics and customer database

2020 value pool
- Annuities
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- Individual Savings

6% · 18% · 34% · 42%

Customer key data — **Life events** — **Scripts database** — **Static Insights**

Transaction history

Customer notes

Customer products — **Voice analysis**

Live Insights

Recommendations
1. Refocus on xxx
2. Probe area xxx
3. Move away from sale
4. Spend x minutes

Current likelihood of sale

Customer Insights Page
Customer Info: **Life Events:**
Name: Joe Bloggs
Age: 36
Address: Woking
1. Getting married in 3 months
2. Enquired about mortgage protection
3. Started new job 4 months ago

Customer Needs:
Mobile App · Term assurance · Online tracking · Saving products · Mortgage protection · Pensions · Loan protection · Critical care

Recommended conversations:
1. Do you require any new protection for your partner?
2. How is the house search coming along, and can we help by getting you a fixed quote for the mortgage protection?
3. I see you do a lot of online tracking, but don't currently use our mobile app – can I help set that up for you?

Relevance for Life Insurers:
— Increased productivity of sales colleagues
— Increased sales through cross-sell opportunities
— Improved customer experience
— Improved employee satisfaction

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1. Cost and speed (underwriting and claims)

Cutting underwriting and claim settlement cost and times with Machine Learning

Case study: automate the evaluation of health insurance claims
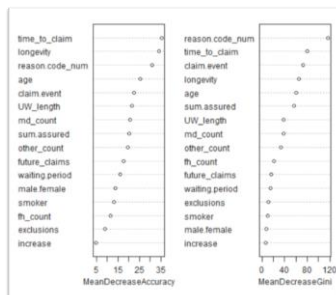Tested three algorithms: Naïve-Bayes, Gradient Boosted and Random Forest
We use machine learning to reduce the number of False Rejections, which have a high reputational cost, and aimed to achieve a financially not-damaging number of False Acceptances.
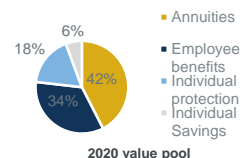

Naïve Bayes

Gradient Boosted Classification

Random Forest

- **Testing the Models**
- **Evaluating the predictive power of each model to choose the best approach**

2020 value pool
- Annuities
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Relevance for Life Insurers:
— Reduce cost and increased consistency in claim processing
— Improved branding and reputation
— Better customer interaction
— Asking better questions

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11

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2. Agility

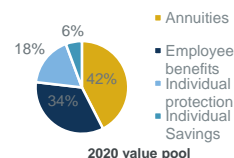# Pricing products using innovative analytics to ensure value for money

Regions with more fast food outlets and lower physical activities have higher mortality rates…

Fast food outlets
Source: National Obesity Observatory PointX Data @2014, Thomson Directories Limited © Copyright Link Interchange Network Limited © Database/Copyright and Ordnance Survey © Crown copyright and/or Database Right 2016 Open Government Licence

Mortality rates
Source: Mortality Statistics: Deaths Registered in UK by Area of Usual Residence, 2014 Contains OS data © Crown copyright 2016 Open Government Licence

Physical activity
Source: Public Health England Contains Ordnance Survey data © Crown copyright and database right 2016 Open Government Licence

2020 value pool
- Annuities
- Employee benefits
- Individual protection
- Individual Savings

Relevance for Life Insurers:
— Identify risks within policyholders based on publicly available data, instead of just data provided by policyholders

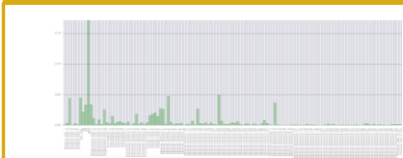Institute and Faculty of Actuaries

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12

6

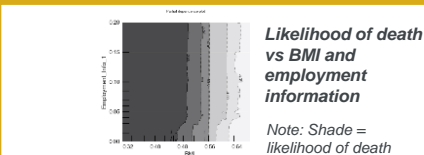**Case study – Risk Scores**

Capturing interactions between risk factors and mortality

Our data scientists have used open data to determine the correlation between various factors to the likelihood of death, which can then be used to help ensure accuracy in pricing life insurance products.
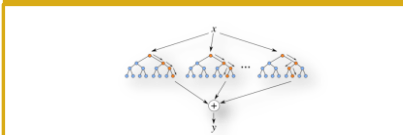
Purpose: To investigate the relationships between factors and the likelihood of death

How: Advanced analytic tools to capture secondary interactions between risk factors

Likelihood of death vs BMI and employment information

Note: Shade = likelihood of death

What: A "random forest" method was used to capture these relationships

Outcome: Predictions were improved and aligned with actual deaths

Relevance for Life Insurers:

— The underlying cause can be determined and used for claim prediction and pricing

— Risk profile of policyholder groups can be better understood

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13

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3. Connecting and sharing information

Engaging customers through gamification

2020 value pool
- Annuities 6%
- Employee benefits 18%
- Individual protection 42%
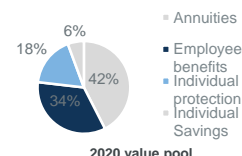- Individual Savings 34%

AIA Vitality programme

— 25% upfront discount on policy if health data is shared

— Further discounts and rewards (e.g. vouchers and movie tickets) for healthy behaviours

— 40% improvement in policy

Generali's gamification of life insurance

— Earn points for healthy living activities, points can be redeemed for discounts or rewards

— Ranking based on points earned

— Recommendations on exercises and nutrition

	Bronze	Silver	Gold	Platinum
	$0	$7,000 (3% savings)	$22,000 (10% savings)	$27,000 (13% savings)

The figures used in this example are hypothetical, are rounded to the nearest thousand dollar for discussion purposes only, are not guaranteed and may not be used to project or predict individual results This example assumes that as of year 20 the applicable stats was earned in every policy year. The status earned every year may affect the amount of total potential premium saving.

Relevance for Life Insurers:

— Better understanding of policyholder lapse and longevity risk

— Attract millennial customers

— Align individual risk to price

Insurance Go

How about the next… INSURANCE GO?

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14

7

4. Personalisation

Allowing customers to tailor products to suit individual needs

| Price: £20 per month | Overall details:[...] |
| Name | DOB | Post code |

I would you like to insure
☐ Just me ☐ My family

Further information
Height | Weight | Annual income

Do you want to take premium breaks during your holidays?
☐ Yes ☐ No

When do you want your cover to pay off?
☐ When I die ☐ When I turn ill ☐ If I stay alive ☐ When I retire after x years

How long do you need your policy to last?
1 Year — 25 Year — 50 Year

Do you want to increase your cover after you are married?
☐ Yes ☐ No

Do you want to link the level of cover to your mortgage?
☐ Yes ☐ No ☐ If yes, how much is your mortgage?

How much cover do you need
£0 — £250,000 — £500,000

2020 value pool
- Annuities
- Employee benefits
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6%, 18%, 34%, 42%

Relevance for Life Insurers:
- — Customers have the ability to dynamically change the terms of the policy to suit their life plans
- — Improves transparency to customers
- — Self-served and cost reduction

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5. New business models

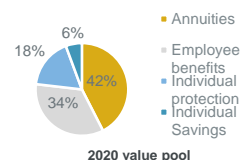# Leveraging Fin Tech to complement existing product offering

2020 value pool
- Annuities
- Employee benefits
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6%, 18%, 34%, 42%

Rapid growth of firms capitalising on the collaborative economy:

- • LendingClub
- • Uber
- • Instacart
- • TaskRabbit
- • Airbnb

These changing behaviours extend to insurance with growth of P2P insurance and newer entrants to investment management businesses.

- • Lemonade
- • Betterment
- • Friendsurance
- • Nutmeg
- • TongJuBao

Newer entrants to financial services can also take advantage of emerging technology such as blockchain, e.g. to structure their contracts to bypass insurers and fund their own coverage pool

Relevance for Life Insurers:
- — Reduce complexity in traditional life products
- — Easy access to life products via apps
- — Leverage Fin Tech firms to complement existing product offering and distribution channels
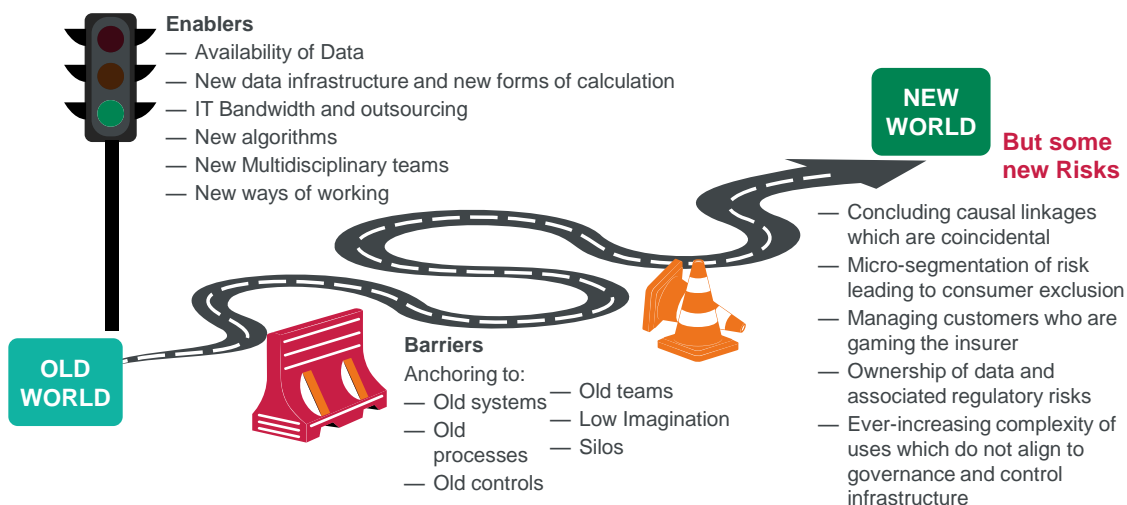- — A path to innovation without anchoring to legacy

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Having started the journey …

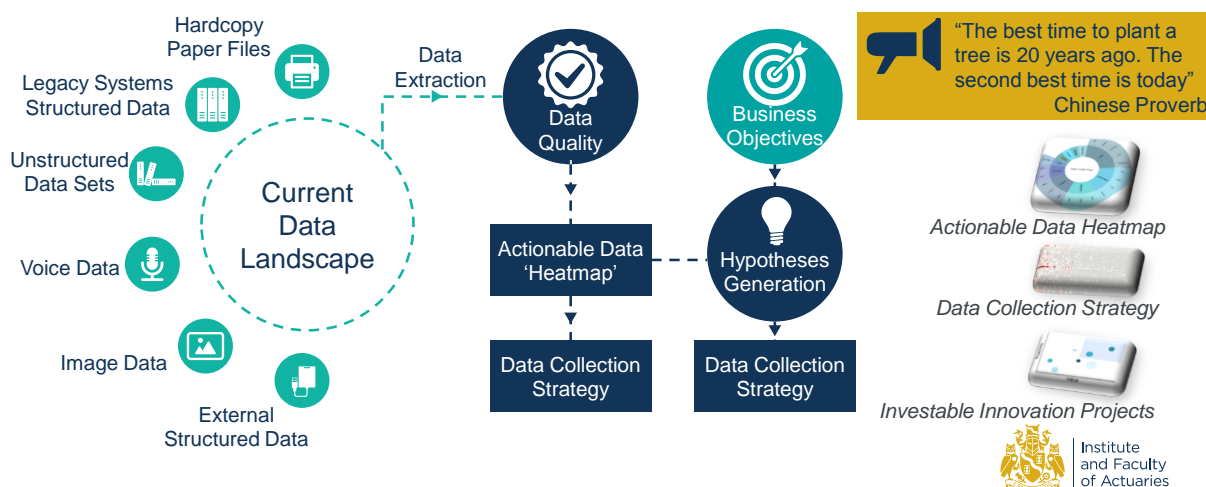# … significant barriers remain presenting new Risks

Enablers
— Availability of Data
— New data infrastructure and new forms of calculation
— IT Bandwidth and outsourcing
— New algorithms
— New Multidisciplinary teams
— New ways of working

NEW WORLD

But some new Risks

— Concluding causal linkages which are coincidental
— Micro-segmentation of risk leading to consumer exclusion
— Managing customers who are gaming the insurer
— Ownership of data and associated regulatory risks
— Ever-increasing complexity of uses which do not align to governance and control infrastructure

OLD WORLD

Barriers
Anchoring to:
— Old systems
— Old processes
— Old controls
— Old teams
— Low Imagination
— Silos

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17

Getting started with Big Data and Analytics

Hardcopy Paper Files

Legacy Systems Structured Data

Unstructured Data Sets

Voice Data

Image Data

External Structured Data

Current Data Landscape

Data Extraction

Data Quality

Business Objectives

Actionable Data 'Heatmap'

Hypotheses Generation

Data Collection Strategy

Data Collection Strategy

"The best time to plant a tree is 20 years ago. The second best time is today"
Chinese Proverb

Actionable Data Heatmap

Data Collection Strategy

Investable Innovation Projects

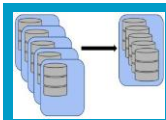Institute and Faculty of Actuaries
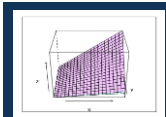
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18

9

Conclusion – Huge potential applications of Big Data but we're only starting the journey

Insurers are focusing on 3 main activities, all of which impact on how we manage Risk

1. Improving the Quality of Data
— Centralisation of data: Improving IT infrastructure, data capture and data management systems.
— Data enrichment from external sources: Utilising public data that are readily available.
— Data aggregation: Strategic alliances with other companies (e.g. fitness tracking and Fin Tech firms)
— Thinking outside the box: Collecting voice data to enable real time response.

2. Focusing on data analytics
— We are transitioning from domain of actuaries to domain of multidisciplinary teams with data scientists.
— Machine enabled insight in policyholder behaviour, key relationships, homogeneous groups. This insight improves the accuracy of forecasting.

3. Business Application is key
— We've summarised a number of uses today but clear benefits of data analytics relate to better categorisation of policyholders, improved price differentiation, enhanced sales strategy and personalised products.
— Other applications include improved risk mitigation, marketing and market positioning.

Questions

Comments

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